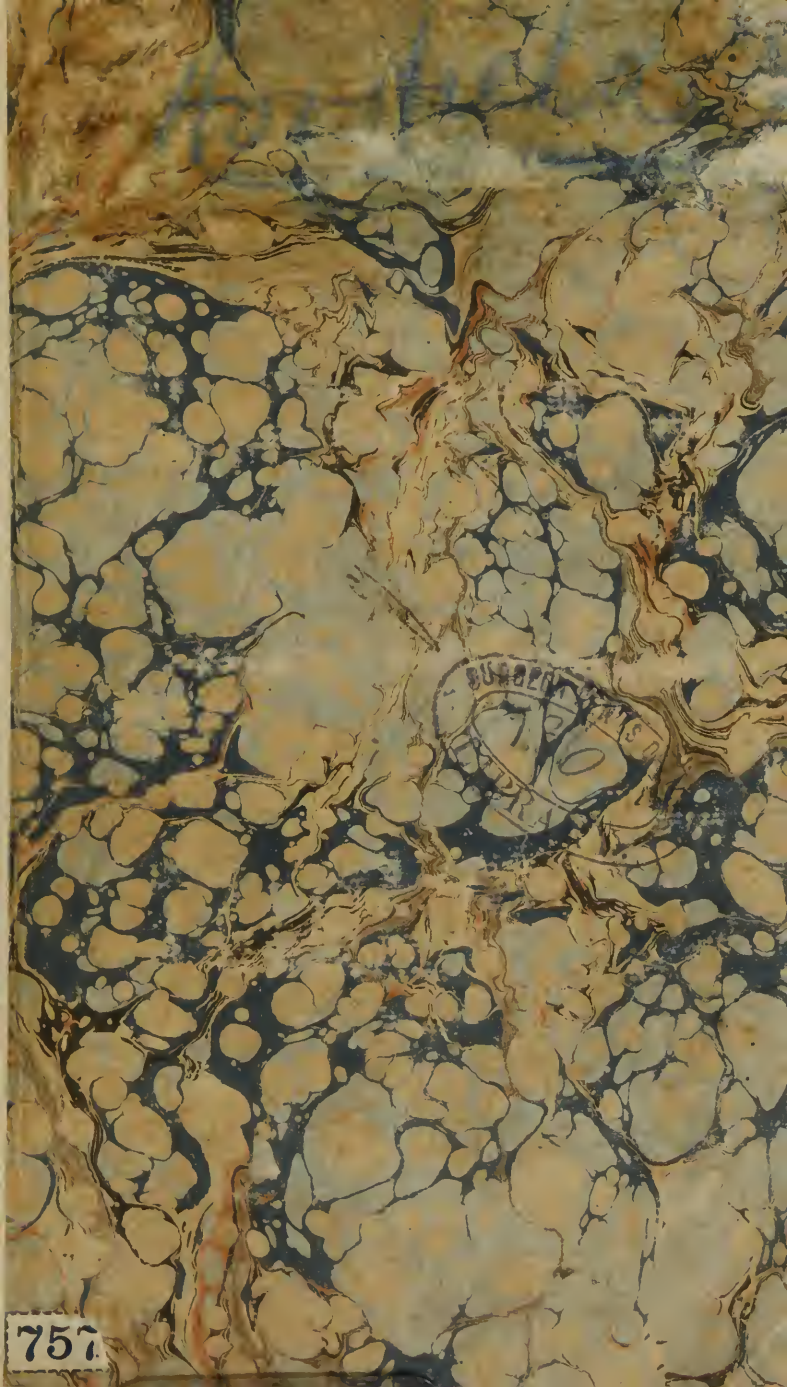


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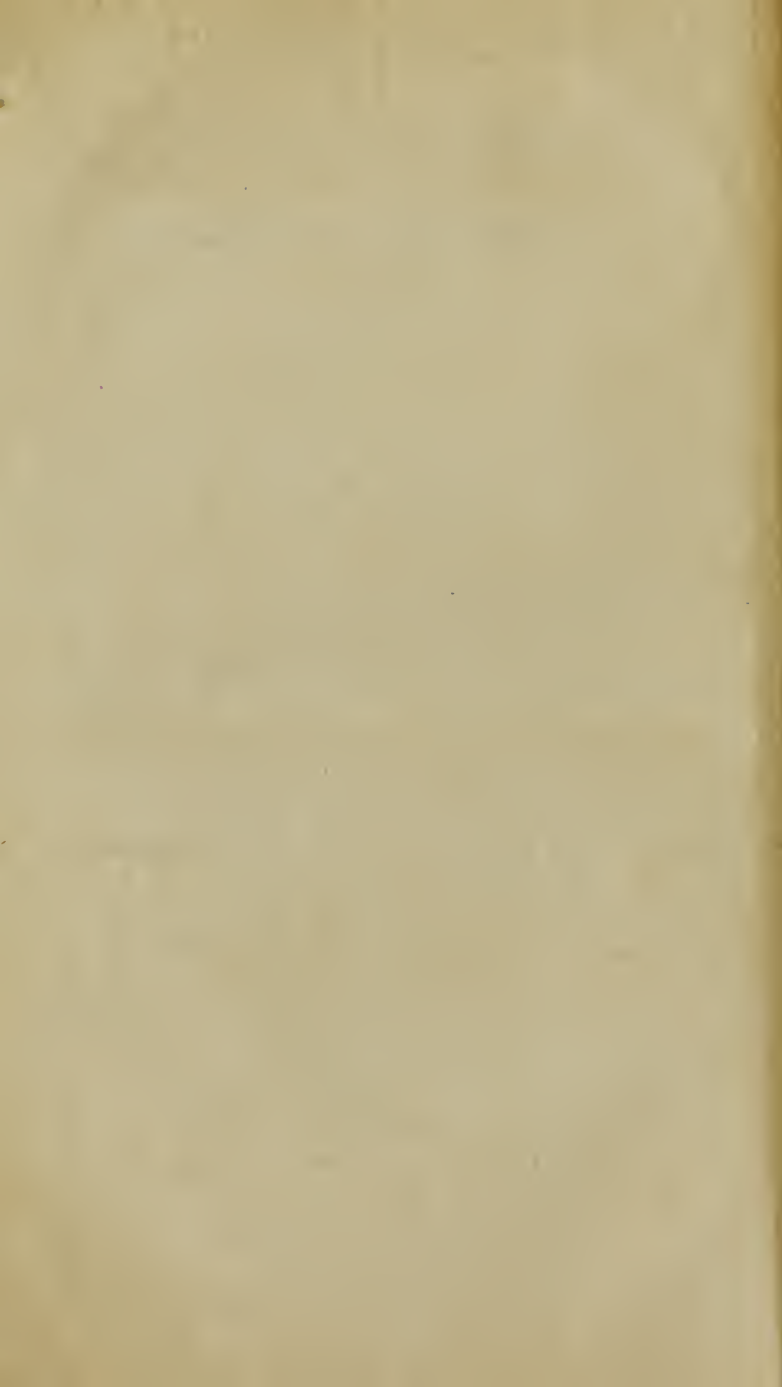
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For Mr. Israel Pleasant
With the best wishes of
the Authors -



AN
Experimental Differtation

ON THE

RHUS VERNIX, RHUS RADICANS

AND

RHUS GLABRUM;

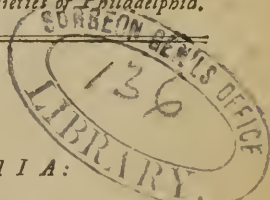
COMMONLY KNOWN IN PENNSYLVANIA BY THE NAMES OF
POISON-ASH, POISON-VINE AND COMMON SUMACH.

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AN
INAUGURAL DISSERTATION
FOR THE DEGREE OF
DOCTOR OF MEDICINE;
SUBMITTED TO THE EXAMINATION OF
THE REV. JOHN EWING, S. T. P. PROVOST,
THE
TRUSTEES AND MEDICAL FACULTY
OF THE
UNIVERSITY OF PENNSYLVANIA,
On the 22d day of May, 1798.



INTRODUCTION.

EVERY enlightened citizen should be interested in the examination of the natural productions of his country. This observation applies with particular force to the United States of America, whose extensive limits afford numerous opportunities, for discoveries and improvements in every branch of natural science. A certain patriotic zeal ought to animate every individual of this republic. As it is indispensibly requisite to the man, whose business it is to defend its political rights from infringement, so it should stimulate that man likewise, whose time and talents are devoted, for the general interest of his country, to the more humble employment of investigating its natural productions.

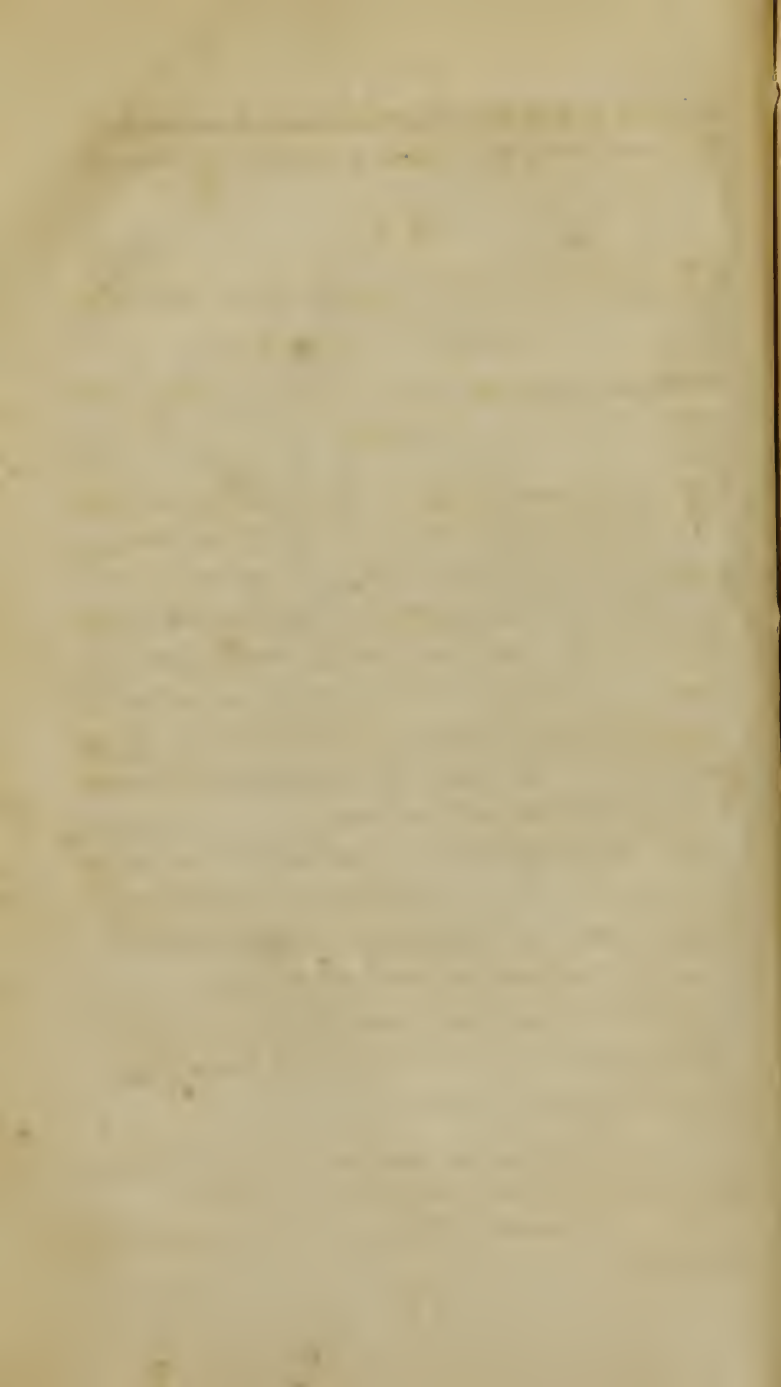
In the choice of a subject for an Inaugural Dissertation, my attention was early directed to the indigenous vegetables of the United States. After several months laborious research, I regret, that I have been able to add but little to our knowledge of those vegetables, which were the objects of my attention.

I wish those experiments which are laid before the public in their present unfinished state, to be considered as an introduction to a series of experiments, on the American species of the genus *Rhus*. Unacquainted with the ex-

tensive nature of the subjects which are considered in the following pages, I found, after having made some progress in their examination, that the complete analysis of each, individually, would afford more than ample employment for all the time that was at my command.

Persons who have been engaged in similar pursuits, are acquainted with the numerous hindrances, which retard the progress of the unexperienced experimenter. Every candid suggestion, from these, will be attended to with care, and acknowledged with gratitude.

To the Managers and Physicians of the PENNSYLVANIA HOSPITAL, under whose parental patronage the author commenced and continues his medical studies, the following dissertation is dedicated, as a small tribute of the esteem and gratitude of an obliged pupil. This excellent institution, while it perpetuates the benevolence of its original founders, reflects great honour on its present administrators. It is not erected, it is true, on the basis of wealth or grandeur, but it is supported by the more solid and durable pillars of science and humanity. It affords to numerous pupils, extensive opportunities for improvement in the practical part of medical science, and it is happily conducive to the relief of much human misery.



My design, at present, is to describe those species, which in the subsequent pages, are the more immediate objects of my investigation: the *Rhus Vernix*, the *Rhus radicans*, and the *Rhus glabrum*.

In the Linnæan system of vegetables, the genus *Rhus* is arranged under the class *Pentandria*, and order *Trigynia*. Dr. Jussieu, in his very learned and interesting work, entitled *Genera plantarum secundum ordines naturales disposita*, has placed it in the fourteenth class of *plantæ dicotyledones polypetalæ*, and twelfth order *Terebintaceæ*.

The following are the characteristic marks of this genus. The Perianth* is five-parted, beneath, erect and permanent. The Corol consists of five petals, which are egg'd and a little spreading. The Filaments are five, very short. The Anthers are small, shorter than the corol. The Germ is above, roundish and of the size of the corol. The Styles are scarcely evident. The Pericarp a berry of one cell. The seed roundish and bony.

Most of our native species of *Rhus*, are not simply hermaphrodite: in several, the male and female flowers are found on different plants; others have male,

* Most of the Botanical terms, which occur in the description of these plants, are taken from the translation of the *Systema Vegetabilium* of Linnæus, by a Botanical Society at Litchfield,

female and hermaphrodite flowers on the same plant.*

1. The *Rhus Vernix*.

This tree is distinguished in Pennsylvania by the different names of: Poison tree, Poison wood, Varnish tree, Poison ash, Swamp Sumach and white Sumach.†

The *Rhus Vernix* is the largest of all our native species of *Rhus*; it grows in some instances to the height of twenty-five or thirty feet; its average height, however, may be estimated at twelve or fifteen feet. It seldom exceeds five inches in diameter.

It delights in ^{fat} soil, in low, marshy places. It is generally found near creeks or rivulets, in dark and shaded situations. Two swamps, which I several times visited, during the course of last summer, are the most desert and gloomy places, which are to be found in the vicinity of Philadelphia. They are ac-

* Walther, from this circumstance, in his *Flora Caroliniana*, has placed the whole of this genus in Linnæus's class of Polygamia: he describes five species.

† This is the *Toxicodendron foliis alatis, fructu rhomboide* of Dillenius. Hort. Elth.

Arbor americana, alatis foliis, succo lacteo venenato; Plukenetii Almagest.

Sitz five Sitz-dsju; vulgo Urus seu Urus no ki.

Arbor vernicifera legitima, folio pinnato juglandis, fructu racemoso ciceris facie. Kæmpferi amœn. exoticæ, p. 791, &c. vide appendix.

Several varieties of the *R. Vernix* are found in Pennsylvania,

cessible with difficulty ; and appear devoted by nature, to the habitation of injurious plants and venomous reptiles.

The common trunk of the *Rhus Vernix*, after arriving at the height of four or five feet, generally divides into two branches, which pursue for some distance, a regular oblique course. In some instances each of these branches is again divided in a two-fork'd manner ; but in many cases, they divide into four or five smaller branches, which are sent off near each other circularly from the circumference of the parent branch, forming a regular verticill. These smaller branches pursue the same oblique course, and are again subdivided, into a number of verticills (or umbells) of branches, which finally send off long, sappy, luxuriant shoots, and are terminated by a thick circular cluster of leaves.

This singular disposition of the branches, gives the tree a very elegant appearance. In some instances the subdivisions are perfectly regular ; all the smaller branches proceed from a main branch in an oblique direction, and give the tree a circularly spreading appearance, highly pleasing to the eye.

The trunk is frequently erect ; in some instances it proceeds from the ground in an oblique inclining direction ; three or four trunks sometimes arise from one root. The bark of the trunk is of a dark grey colour ; in the upper branches the colour is lighter. The bark of the young trees is generally smooth, it

becomes rough and furrowed as they advance in age. The wood is light, brittle, and of a spongy texture ; the younger branches are tubular and contain much pith. They can easily be made hollow, and have been used by the natives, in making flutes or whistles ;* they are also employed in the preparation of their calumet or pipe of peace.

It has been an opinion, which at one time was pretty generally received, and which has been copied from one description of the tree into another, that the wood when touched, imparted to the hand an evident sensation of *cold* ; and that by this circumstance alone, it might be distinguished from every other tree of the forest. This appears to be a vulgar prejudice, originating from a certain degree of terror, which is always associated with this tree.† I have frequently touched it, with a view to be made sensible of this coldness ; but I never found it to differ in the smallest degree in temperature, from the trees in its vicinity.

* Kalm.

† “ My neighbour (says Dudley, Philos. Transact. 1720) that was so sadly poysoned with handling it, told me one thing very remarkable of the wood ; (of R. Vern.) and that is, that when he touched it, he plainly perceived it to differ from the other wood, that he was throwing up into his cart ; for it was as cold as a piece of ice ; and withal assured me, he could distinguish it blindfold, or in the dark, from any other wood in the world, by its coldness ; *but the poor man is as much afraid of it, when he goes into the woods, as of a rattle snake.*”

The leaves break forth about the beginning of May ; at their first appearance they are of a cupreous, or of a dark yellow colour ; after being fully expanded, their superior assumes a lively deep green colour, while their inferior surface is considerably paler. The leaves are compound: each leaf consists of four or five pair of pinnæ (is five-feathered or winged) which are placed opposite, on very short petioles, and are terminated by an odd one.* The separate leaflets are smooth, intire, egg'd, and terminate in an acute somewhat elongated point. They are divided into two equal parts by a nerve, which is continued from their separate petiole in a straight course through the leaflet, and from which a number of smaller nerves run to its margin. The common petioles and the nerves of the leaves, are frequently of an elegant red colour. In some instances the leaves are slightly sinuated near their point : and in a few cases I have observed their inferior surface, covered with a slight down.

They are of a strong tough consistence. Linnæus's specific character of the Vernix is : *leaves feather'd most intire annual opaque, petiole intire equal.*

The flowers make their appearance, in the neighbourhood of Philadelphia, during the first or second week of June; in the more northern parts of Penn-

* The number of wings varies considerably ; in some instances I have found three, in others six or seven.

sylvania, I have found the tree in blossom during the first days of July. The flowers are arranged in small separate racemes, which form, at the termination of a long common peduncle, an interrupted panicle (of flowers) of considerable length. The peduncles with the terminating panicles, frequently extend to the length of six or seven inches. The peduncles always originate from the smaller branches, at the basis of a common petiole of the leaves, by which they are surrounded and supported. The flowers are chiefly produced near the end of the branches, where they exist in great abundance; they are arranged in common with the leaves that support them, circularly around the lesser branches, forming, when the tree is in blossom, a beautiful globular cluster of leaves and flowers. They are very small and of a yellowish or herbaceous colour. Their odour is very agreeable, and during the flowering of the tree, they attract innumerable swarms of bees; I have never heard that the honey collected from them, is supposed to possess any deleterious quality.

The male and female flowers of the *R. Vernix* (like those of several other species of *Rhus*) are in most cases, produced on different plants: I have not perceived any difference in the growth of the male and female trees.

The flowers are succeeded, on the female plants, by seeds which are arranged on their panicles, in the same manner as the blossoms; they somewhat re-

semble bunches of small grapes, and are ripe about the middle of October. The seeds are not perfectly globular, but a little compressed. They are surrounded in their dry state by a thin light green cortical covering, which before they become dry, contains a pulpy substance; when this exterior thin shell is removed, the compression is more evident, and the seeds appear striated. They are of a yellowish colour, and about one fourth part of the size of one of our common peas. They are very hard, and when broken, are found to contain a small yellow kernel of an oleaginous nature.*

The roots of the *R. Vernix* are large, irregular and knotty; they generally run some distance near the surface of the ground.

To determine the question: whether the tree which has been described in the preceding pages, be the same with that, from which the famous varnish of several oriental countries is obtained? has, at different times, been an object of attention, among Botanists of the first reputation. The oriental Varnish-tree has been described with great accuracy by Kæmp-

* “Candles, which are burned on particular festival days in *Japan*, are prepared of an oil procured by expression or decoction from the seed of the *Rhus Vernix* and *R. succedanea*; the latter of which grows in many districts of *Japan*, and produces a great quantity of seed. The expressed oil of the seeds of the *R. succedanea* is also used by the *Japanese* in preparing their victuals.” Thunberg’s travels.

fer, in his *Amœnitates exoticæ*. (Of this description an extract is given in the appendix.)

From a very accurate comparison of Kæmpfer's description of the Varnish-tree of the Japanese, with the R. Vernix of our country, and from frequent comparisons of the leaves of our R. Vernix, which I procured from different parts of Pennsylvania, with Kæmpfer's figure of the Vernix of Japan, I am fully convinced that they are identically the same.

This opinion was also entertained by Linnæus, Miller, Dillenius, Clayton and Thunberg.

To trace the similarity of our Varnish-tree, with that described by Kæmpfer, in all their different parts, would lead to a tedious prolixity.*

A long and acrimonious controversy, concerning this subject, was carried on, about forty years ago, between Mr. Philip Miller and Mr. John Ellis.† The former contended for the sameness of the American Varnish-tree with that of Japan ; which the latter positively denied. To relate, in this place, the different opinions and arguments, which were adduced on

* Dillenius, in his description of the R. Vernix, remarks : " It should not seem strange, that the Varnish-tree should be found in America near the same latitude with Japan ; since the Ginseng, the Bignonia, commonly called Catalpa, with many other plants, are found to be natives of these countries. And I question, if the Tea-tree might not be discovered in America, if persons of skill were to search for it."

† See London Philos. Transact. Vols. 49 and 50.

both sides of the question, would be neither interesting nor instructive. I have perused their different papers with much attention, but I find nothing in them to induce me to change the opinion above advanced. The dispute certainly was carried on under very unfavourable circumstances: the difficulty of procuring specimens from foreign countries; the imperfection or fallacy of specimens when procured; and the variations, to which vegetables naturally are subject, when removed from their native soil to distant and unaccommodated climates, has led them, on both sides, into many inaccuracies and mistakes. Every person, acquainted with Botany, who has seen the trees in their native countries, will readily discover the sources of their deception. It is to be regretted, that while the plants concerning which they differed in opinion, were natives of Japan and North-America, their controversy was unfortunately carried on in Great-Britain.

One of my chief objects, in investigating the properties of our *R. Vernix*, was to determine, whether it contained the same singular varnish-like juice, which is obtained from this tree in Japan; and whether this juice might be employed with advantage, by our artists, in the preparation of varnishes.

My first trials were instituted at that season of the year, when in trees of a similar growth, the sap or juice is found in greatest abundance. During the first week of May, on a warm day, I made a number

of circular incisions into the bark of a tree of moderate size ; these incisions were immediately followed by a very copious flow of a viscid fluid, which at first was of a white or light yellow colour, but which upon a short exposure to the air, became brown, and in some instances nearly black.* I was able in the course of about half an hour, to collect from this tree, half an ounce of its juice. I made similar incisions into several other trees, in the neighbourhood of the first ; and by repeated collections on different days, I obtained several ounces of this varnish.

If the vessel in which this juice has been collected, is immediately closed, it retains its original white or yellowish colour, and becomes brown only on that surface, which is in contact with the air. The juice has a sweet, but somewhat disagreeable odour ; it is viscid,† glistering and pellucid ; its taste is acrid ; it imparts when fresh, a slight sensation of heat to the tongue, and when swallowed irritates the fauces and excites coughing. It appears to agree in every particular, with that described by Kämpfer, as flowing from the Varnish-tree of Japan.

* The juice which accidentally exudes from the tree and dries on its bark, always assumes a jet black colour.

† “ From the *Toxicodendron*, when wounded, issues a great quantity of juice, which when exposed to the heat of the sun, turns so very clammy, that it proves a good birdlime, and is with great success made use of for that purpose.” Hughes’s Natural History of Barbadoes.

About the middle of May, when the leaves are fully expanded, I perceived that the juice flowed less copiously out of incisions into the bark ; its quantity gradually diminished, and during the first week of June, the decrease was very evident. I found, however, by frequent trials, that at every period of the year, from May till September, some juice always followed an incision into the bark.*

My next object should have been to determine the application of this juice, to the art of varnishing : this I have not been able to accomplish. The investigation of some of the properties of several other species of *Rhus*, engaged all the time I could devote to these pursuits. Perhaps I would have been more usefully employed in determining the properties of this varnish. From its very great analogy to the oriental varnish described by Kæmpfer, it is evident that it promises considerable utility in the art of varnishing : it is a matter of importance, and will be the object of some of my future researches.

2. *The Rhus Radicans.*

This plant is generally known in the United States, by the name of *Poison-Vine* ; in some parts of Pennsylvania it is called *Poison-Creeper*.† It grows only

* The juice flows more copiously after wet weather.

† This is the *Toxicodendron triphyllum glabrum* ; Tournefort. institut.

Hedera trifolia canadensis ; Cornuti.

in a fertile soil ; but is capable of existing in different situations ; sometimes it is found near rivulets, at others in dry and elevated places.

The *Rhus radicans* has a slender ascending stem, which supports itself on the bodies in its vicinity. Like various species of Ivy, it frequently climbs up to the top of our tallest trees, arriving at the height of forty or fifty feet. It appears to delight in ascending the lofty oak trees, which surround the fields of our farmers. Very often it is met with along the sides of fences, which serve it as a very convenient support. Its stem rarely exceeds two or three inches in thickness ; in a few plants which were growing in a very fertile soil, I have seen it nearly five inches in diameter. The stem in many cases is compressed on the sides ; sometimes it is interrupted by small tubercles. It is covered with a grey bark, which in young plants is of a lighter colour.

If the *R. radicans* happens to grow in situations, where it meets not with a support, it never exceeds four or five feet in height ; in these instances its growth is always winding or oblique ; its branches frequently return and creep along the ground. In some cases it is forced to pursue this procumbent

Dillenius's *Toxicodendron rectum*, foliis minoribus glabris, is a variety of our *Rhus glabrum*.

The Delaware Indian name is *Pu-tjehis-ktey*. D. Zeisberger's spelling book.

I have observed several varieties of this species of *Rhus*.

course for a considerable distance, without exceeding two or three feet in height.

In order to attach itself in its ascent, to trees and other substances, the stem and branches of the *Rhus radicans* are furnished with a great number of long, thin, threadform radicles or tendrils; which proceed in abundance from almost every part of the stem and branches. It is from these numerous radicles, that it has obtained its specific name of *radicans* or rooting.* By means of these radicles it sometimes adheres with so much force to the neighbouring bodies, that it is difficult, and not unfrequently impossible to detach, without breaking it. I have frequently seen large plants, so completely enveloped with a thick coat of these tendrils, that no part of their bark was visible.

From the bark of the *R. radicans*, when it is wounded, exsudes plentifully a milky juice : in proportion to the size of the plants, it appears to flow as copiously from the *Rhus radicans*, as it does from the *Vernix*. After a few hours exposure to the air, it takes on an intensely *black* colour ; in its other properties it resembles the juice obtained from the *R. Vernix*. Its taste is acrid and somewhat aromatic. A similar juice exsudes from the leaves, immediately after being detached from the plant ; this juice has

* In very young plants these radicles frequently are of a beautiful crimson colour.

been employed in a few experiments, which will be related in a subsequent part of this dissertation.*

The trunk of the *Rhus radicans*, almost during its whole course, sends off lateral branches in an oblique or rectangular direction; which frequently proceed to the distance of two or three feet, and in their course again send off a number of lesser branches. The smaller branches are very slender and frequently pendulous. This arrangement of the branches, gives the plant, where it stands exposed to view, an irregular and bushy appearance.

If it grows in situations, where it is supported for a small distance only, it sends off, near the top, numerous branches, which spread irregularly in various directions.

The *Rhus radicans* frequently pursues a spiral course around its neighbouring trees; it is frequently intertwined in a beautiful manner, with our *Hedera quinquefolia*.

Its wood is brittle, but more firm than the wood of the Vernix.

The leaves of the *Rhus radicans*, are trifoliate (three'd;) the common petiole, on the larger plants, is several inches in length. The two lateral leaflets are supported by very short petioles; while that of the terminating leaflet is somewhat longer. The

* When the bark of the *R. radicans* is burned, it emits a smell resembling that of burning chestnuts or cashew-nuts.

leaves generally are intire, egg'd, smooth and terminated by an acute point ; they are divided, in the middle, by a prominent nerve. But I know few plants, the form of whose leaves is so various : sometimes they are pretty regularly saw'd, at others irregularly sinuous ; in some instances they are nearly oval, in others they are lance-shaped. According to Linnæus's specific character the leaves are : "*three'd: leaflets petioled, egg'd, naked, most intire.*" When they first appear in spring,* they are of shining red or of a copper colour ; after having arrived at perfection, their superior surface is of a light green colour, which is paler beneath. They are thin and of a weak texture. When dried, and preserved in a box, they have a very agreeable odour, very much resembling that of Bohea-tea.

I have been informed, by Dr. Barton, that the leaves are eaten by horses, with impunity ; they are also eaten by cows ; and sheep (according to Professor Thunberg, in his travels) eat the leaves of a similar species, the *Rhus lucidum*. Horses, Mr. William Bartram informs me, are very fond of the leaves of the *Rhus toxicodendron*.

The flowers are produced along the whole course of the lesser branches ; they mostly originate at the basis, and just within the common petiole of a leaf,

* In the vicinity of Philadelphia about the latter end of April, in the back parts of Pennsylvania, later.

though many of their peduncles are sent off separately. Their peduncles are very short, and their panicles are less complex than those of the *R. Vernix*; about fifteen or twenty flowers are generally supported by one common peduncle. The flowers are small, and their petals of a light-yellow colour.* They have a most delightful odour, which resembles, but far exceeds in suavity, the odour of the *Reseda odorata*.

The male and female flowers are generally produced on different plants.

Irregularly round, striated berries, of a green colour, succeed the female flowers; they contain a small hard seed, which is laterally compressed. They ripen about the beginning of October. The seeds are very permanent, and frequently adhere to the branches, in a dry state, during the course of a whole year.

The roots of the *R. radicans* are slender; they run near the surface of the ground, and in their course, send forth a number of young plants.

3. *The Rhus glabrum, common Sumach or smooth Pennsylvanian Sumach.*

This plant is found abundantly in almost every part of Pennsylvania. It grows in a loose, fertile soil; frequently upon vacant or uncultivated fields, and along the sides of roads and fences. It sometimes rises to the height of eight or ten feet; in many instances it does not exceed four or five feet.

* They appear about the beginning of June.

The trunk of the *Rhus glabrum* is seldom erect ; after rising in an incurvated or oblique direction, to the height of two or three feet, it divides into several large branches.

The small branches, which they send off, are disposed in such a manner, as to form numerous, irregular oblique angles. They are covered with a smooth light grey or reddish bark, containing a viscid, glossy, yellow juice, which is not changed upon exposure to the air. The wood is very light. The leaves, like those of the Vernix, are compound ; each leaf consists of nine or ten pair of leaflets or wings, which are placed opposite, and are terminated by an odd one.

The leaflets are smooth, lanced, sawed and acute ; the Linnæan specific character is : *leaves feather'd saw'd, lanced, naked on both sides*. It is said, the leaves when dried, are mixed by the Indians with the tobacco they use in smoking.

The leaves which in summer are of a deep green colour, change to a beautiful red, in autumn ; hence, what Kæmpfer elegantly remarks of the spurious Varnish-tree of Japan, may with strict propriety be applied to the *R. glabrum* : “ *Rubore suo autumnali, quo viridantes sylvas suaviter interpolat, intuentium oculos elonginquo in se convertit.*”

The flowers are produced in large, erect, compound thyrses, at the termination of the superior branches. They are of an herbaceous colour. They appear about the beginning of July.

The seeds are arranged, like the flowers, in large conical thyrses. They are of a dark red colour; and after their arrival to maturity, early in autumn, covered with a white tenacious powder, of an agreeable acid taste. The berries with their saline covering, have been subjected to several experiments, which will be related in a subsequent part of this dissertation. From this white, saline powder, which is found on the berries, the *Rhus glabrum* has been called, in various parts of Pennsylvania, *Indian Salt*.*

Of the POISONOUS QUALITY of SEVERAL SPECIES of RHUS.

My observations under this head, apply chiefly to the *Rhus radicans* and the *Rhus Vernix*. These two plants in consequence of the deleterious effect they produce on the skin, and by means of it on other parts of the human body, have been called *poisons*; the former, as if it claimed that name in preference to all other substances, is called in some parts of Pennsylvania, *the poison*; and both formerly belonged to a genus denominated in systems of Botany, *Toxicodendron*.

*“Indigenæ hac substantia ad carnes condiendas utuntur.” Schœpf.

“The seed of a certain species of *Rhus*, was formerly used, according to Pliny, for seasoning meat, instead of salt; and was thought to render all flesh-meat more savory and grateful to the palate.”

James’s Med. Dict.

“The berries are used as a mordant, or fixer, for the red colour with which the Indians dye their porcupine quills.”

Dr. Barton’s Collect. to a m. m. of the U. S.

As I shall have frequent occasion, in the course of the following observations, to use the term poison, it may be proper to remark, that with physicians and naturalists this term ought to be considered as entirely of a relative nature. The most innocent and salubrious substances, may at certain times and in improper doses, produce effects similar to those generally ascribed to poisons ; while the most active or injurious substances, such as opium or arsenic, administered at a proper time and in proper doses, produce the most beneficial effects.

Poisons according to their different nature, affect different parts of the human body : some, as stramonium and several other narcotic vegetables, appear to act chiefly on the brain ; others act specifically on the blood, for instance the poison of the viper ; some act primarily on the lymphatics ; while others as opium, hyosciamus and the contagions* of the plague and yellow fever, may be considered as universal poisons, which exert their influence on every part of the human body.

A large proportion of poisons, belong to that class of the *Materia Medica*, which has been happily called by Dr. Darwin *Incitantia*. The articles of this class *incite* the motions of the different parts of the human system ; they produce an increase of the action of the

* Dr. Rush's Lectures.

heart and arteries, increased secretions of the glands and viscera, and excels or irregularity in the action of the organs of sensation and thought: effects which are analogous to the operation of the following well known articles of the *materia medica*: opium, electricity, alcohol. This inciting effect is produced in a peculiar manner, on the *cutaneous system*, by the *Rhus radicans* and the *Rhus Vernix*, which have been ranked with propriety among the *topical* incitants.*

In treating of the poisonous property of these two plants, I shall first enumerate the various methods in which their effects are communicated to the human body; I shall then describe the morbid symptoms which are produced by them; and lastly, I shall mention the remedies by which these symptoms are obviated, or cured.

Ever since these plants have attracted the notice of naturalists and of other persons, it has been observed, that the susceptibility of receiving their poisonous influence, exists in different constitutions in very different degrees. While some are affected with a cutaneous eruption by their exhalation, at the distance of twenty feet, others are not affected by freely handling them, or by applying their juice to the tongue and fauces.

The cause of the different predisposition to this eruption, has never been satisfactorily explained. Ir-

* Dr. Barton.

ritable habits, it has been observed, are more liable to be poisoned than others ; yet, even among persons, whose irritability is nearly alike, the tendency to be acted upon by this poison, is very various.

The following circumstances have considerable influence, in varying, in the same person, the aptitude to the reception of the poison.

1. A warm or cold climate ; “ In the southern climates these plants are more active than in the northern.”*

2. Different seasons of the year ; this I have very strikingly experienced in my own case. The *Rhus Vernix* never affects me in the smallest degree, except on very hot days in summer.†

3. Infancy or manhood ; Dr. Barton has remarked, that children are more readily poisoned than adults : several instances in proof of this, have fallen under my own observation.‡

* Dr. Barton.

† “ They are more active in spring and summer, than in autumn and winter.” Wangenheim, von den Nordamerikanischen Holzarten. Göttingen, 1787.

‡ This I believe is the case with most other cutaneous diseases. An intelligent person informed me, that during his infancy, he was very easily infected by the itch ; but, that since his arrival to manhood, he is, upon exposure, much less readily affected by that disease. I also met with a person, who in early life was readily poisoned, by the common Rue of our gardens, in whom this plant produced no effect, after having advanced in age.

4. Exposure before or after a meal ; “ These plants more readily poison immediately after than before a full meal.” *

5. The presence of moisture ; it is very generally believed, by inhabitants of the country, that the effluvia of the plants, when combined with moisture, are most apt to produce the eruption. According to several facts which I have collected, this opinion deserves credit. It requires to be further investigated.†

6. A state of increased perspiration, at the time of exposure to the poison, has a most powerful influence, in rendering persons more susceptible of the eruption. Of this I had several unequivocal proofs during the course of last summer ; in collecting the juice of the *Rhus Vernix*, if I was in a state of high perspiration at the time, I never failed to be affected, more or less, with the eruption ; if my skin was perfectly dry, the poison produced not the least effect upon me. Professor Kalm remarked the same during his travels ; speaking of the *Rhus Vernix*, he says : “ I found,

* Dr. Barton.

† That moisture does not destroy their poisonous quality, appears by the following quotation from *Fontana on poisons*, v. 2. Fontana in order to examine the air of the leaves of the *Toxicodendron*, as he knew that he was easily poisoned, observes : “ I caused them to be got ready by another person, but I touched a few of the leaves when *under water*. In four days my face and eyes swelled, &c.”

however, that it could not exert its power upon me, when I was not perspiring.”

Females, Dr. Barton has observed, are more easily affected than males.

Of the different species of *Rhus*, which are natives of the United States, three are considered poisonous. They vary in their degree of activity. The *Rhus Vernix* is the most violent, and the most universal in its effects : the *toxicodendron* and *radicans*, though they resemble it, possess the poisonous property in an inferior degree : many persons who are never poisoned by the *radicans*, are easily affected by the *vernix*. From a number of observations and facts, I am inclined to believe, that with the existence of certain circumstances, such as warm weather, and a state of high perspiration, no person would be found entirely insusceptible of the poisonous influence of the *Rhus Vernix*.

The manner in which the eruption is excited, like its degrees of violence, is subject to many variations. It is mostly produced by one of the following circumstances :

1. By the exhalation or effluvium of the plants. Although this may be questioned by persons, who have not had an opportunity of observing their effects, yet, the facts in proof of it are so numerous, and many of them so decided and unequivocal, that not the least doubt is to be entertained on the subject. Dr. Barton and Dr. Woodhouse both informed me,

that they had been poisoned in this manner. In these cases the first symptoms frequently shew themselves on the face and hands: but, though the poison appears to be applied principally to these, yet its effects in most instances, soon become general. To what distance the exhalation is capable of extending its influence, I have not been able accurately to determine. My observations lead me to believe, that in very excitable habits, it extends at least to fifteen or twenty feet.*

A second method is: the *smoke* of the burning wood. This circumstance is pretty generally known, and I believe generally admitted. Several facts in proof of it, were communicated to the royal society of London, by Dr. Sherard and Mr. Dudley, before the year 1720.†

It is also noticed by Kalm in his travels and by Wangenheim.

From several observations, I am induced to believe, that the effect in these instances, does not depend simply upon the smoke of these plants, but, that the particular part, in which the poisonous quality con-

* Some authors ascribe the poisonous effect to the *scent* of the plants; this appears to be a mistake; the odour, especially of the radicans, is by no means strong, it is scarcely perceptible when a person is in contact with the plant, nor is any specific effect produced on the Schneiderian membrane.

† Philos. Transact, Abr. v. 6. p. 307 and 308.

lifts, is volatilized by the application of heat, and spreads its influence in every direction. Persons frequently are poisoned by sitting near a fire, in which some of the wood of either species is burning, without the least particle of smoke coming in contact with any part of their body.

Dr. Cooper was poisoned by the steam arising from a decoction of the *Rhus radicans*.

3. By the actual *contact* of the leaves, stem or branches of the plants: in this manner, I believe, the eruption is most generally excited.*

4. By the immediate application of the *juice* of the plants, to the external surface of the skin, or by introducing it by inoculation, within the cuticle. In some persons, who can handle the leaves and branches without injury, the eruption is excited by the application of the juice to any part of the skin.† That the poison can be communicated by inoculation, was first demonstrated by an experiment made by Dr. Barton, during the last spring. I was since led by accident, to observe the production of the disease, by the insertion of a very small quantity of the juice, between

* Mr. N. Jones informed me, that he knew a numerous company of boys to be poisoned, by their using a stick, cut from the *Rhus Vernix*, in playing at ball.

† Its application to the cuticle in the palms of the hands, is in some cases, an exception to this rule; in one instance, the juice being applied to these parts did not produce any effect, till it was communicated by contact to other parts of the body.

the cuticle and cutis. In two or three instances I observed a slight eruption, after phlebotomy, with a lancet, the quantity of juice communicated by which, must have been so very minute, as to render it scarcely conceivable, how the eruption was excited. (The peculiar symptoms, produced by inoculation, will be detailed hereafter.)

In illustration of the foregoing positions, many facts might be related, but this would lead to a prolixity, perfectly inconsistent with the design of this dissertation.

The particular part of these plants, in which this deleterious property resides, appears to be their *juice*, which as was observed in the history of their growth, exudes plentifully out of incisions made into the bark. This juice is highly acrid and corrosive; which is evident from its application to the skin of persons, who are not liable to be affected by the plants; in these cases it uniformly produces, like nitrous acid, or lunar caustic, a destruction and desquamation of the cuticle. It is capable of being volatilized by heat; and during the life and vigour of the plant, it appears to be exhaled, in form of a peculiar gaseous fluid possessing its specific qualities, surrounding and defending the plant by an *atmosphere of poison*.

The manner in which those different symptoms are produced, which will soon be described, I have not had an opportunity of examining with sufficient ac-

curacy. It will appear evident from a review of these symptoms, that the poison induces in the vessels of the skin a peculiar morbid action; an inflammation *sui generis*. This inflammatory action exists in different degrees: in some instances the poison produces merely an erysipelatous eruption, which in others advances to effusion, to suppuration and to ulceration.

This I acknowledge is speaking only in very general terms; it is repeating what must be obvious to every person who examines the disease with attention. At present, however, I have neither time nor inclination to speculate on the pathology of this singular cutaneous affection. The subject is open for further investigation.

I proceed now to the description of the *symptoms* which occur, upon exposure to the poison, in any of the methods above enumerated; and, in the first place, I shall describe them, as they appear in persons but moderately disposed to the disease. The interval of time, between the exposure and the appearance of the poisonous eruption, is various. It depends in a great measure upon the disposition of the person to be acted upon by the poison. In certain habits the effects appear in a few hours, in others not till in as many days.

A slight degree of itching, or a sensation of heat, is the first harbinger of the approach of the eruption;

this itching gradually increases, and is followed by redness and inflammation of the skin, which in some instances is very extensive, and in others is confined to round circumscribed spots, or to longitudinal streaks. The inflamed parts now become somewhat elevated and tumefied; small vesicles appear on their surface, containing a pellucid fluid, which gradually increase in size. The fluid soon becomes yellow, and after some time, takes on the colour and consistence of pus. The vesications in some cases are found separate, but where the inflammation has been violent, their number is mostly so considerable, that they come into contact, run into one another, and cover a considerable space. After the vesications are completely distended, they break, and some of their pus being discharged, by drying on their surface, forms a yellow incrustation.* In this state if the vesicle is single, it somewhat resembles a pustule of the small pox: but where the vesications have been numerous, their purulent surface is proportionably extensive; so that towards the end of the disease, large surfaces are covered with a yellow incrustation, which in a short time becomes brown. The disease generally terminates by a desquamation of this crust, which leaves

* If the vesications be irritated by scratching or by friction, large quantities of serum or pus are discharged from them; the incrustations in these cases are formed sooner, but are less regular on their surface.

the skin very tender and of a florid red colour.* A very troublesome itching accompanies the whole course of the eruption. It is very seldom that scars remain after its disappearance. Four or five days are generally required for the eruption to pass through these different stages.

Somewhat like this is the common course of the disease when left to itself ; but, like all other diseases, it is in its progress subject to innumerable variations. These depend, in a very great degree, on the habit of the person affected. By the application of the remedies which are to be mentioned hereafter, its progress in moderate cases, can be prevented ; and in violent cases the symptoms may be much relieved and their period shortened.

I now proceed in tracing the history and symptoms of this disease ; and in the first place, I shall mention several deviations from its usual course.

1. In many cases, although the disease does not exist in a violent degree, yet it is not terminated by passing through the several stages above enumerated. The eruption being excited in one part, is often propagated to the part lying contiguous to it, from whence by slow degrees, it passes in some instances, through the whole cutaneous system. Thus there

* If the eruption has been very slight, or if it has been stopped in its progress by the early application of proper remedies, still the cuticle of the affected parts, is universally thrown off.

exists in different parts of the body, a constant succession of separate eruptions passing through their several stages.

2. The itching and the vesications which take place in the incipient stage of the eruption, frequently disappear and return several times successively. In some instances pustules of considerable size, are entirely reabsorbed.

3. The poison appears to have a peculiar capricious disposition, to attack particular parts ; in most persons the *eyes* are specifically affected ; in some the body, the legs or thighs. A peculiar and distressing itching of the *scrotum* and of the *præputium penis*, is one of the most general and characteristic symptoms of the disease, which in males, I have found to take place in every instance that has fallen under my notice, with but *one* exception. In quibusdam occurrit erectio penis. An *fœminis labia pudendæ* similiter affectantur ? Its peculiar tendency to affect the eyes, is most strikingly observed in persons that are readily susceptible of the eruption ; in most of these, if its progress is not opposed by proper remedies, blindness of a longer or shorter continuance, is the certain consequence.*

* Although I am but little disposed to the eruption, yet whenever the smallest degree of it is excited in me, my eyes are primarily affected : a slight tumefaction of the eyelids and of the skin immediately below the eyes, takes place, this is accompanied

It has been observed that the eruption, when it is re-excited, has a particular disposition to affect again the same parts, that were formerly affected.

In habits which are very susceptible of the poison, the same symptoms occur, which were above enumerated; but they make their appearance earlier, continue longer, and exist with much more violence. The symptoms peculiarly distressing in these cases are. excessive *tumefaction*, vesications covering very *extensive surfaces*, sometimes almost the whole body, and extreme *pain, heat and itching*.

The tumefaction is in some instances confined to the parts first affected, in others it is general; the extremities sometimes swell to twice their natural size.

“ I was acquainted, says Kalm, with a person, who merely by the noxious exhalation of the *Rhus Vernix*, was swelled to such a degree, that he was as stiff as a log of wood, and could only be turned about in sheets.” I know a person, whose face in the latter stage of the disease, was covered with incrustations in such a manner, that he resembled a person, having

by a sensation of fulness, by heat and itching, and followed by a scarlet eruption, extending circularly several inches around the eyes.

Not only in this, but in several other cutaneous diseases, the eyes are specifically affected: blindness of a short continuance, frequently occurs in violent cases of the small-pox.

the confluent small pox, in the highest degree of violence. And the vesications and subsequent ulcerations, are sometimes so extensive, and their consequences so terrible, that not unfrequently four or five weeks elapse, before the person recovers. In this situation as we may easily conceive, the patient suffers immense torture ; the whole course of the disease is accompanied by incessant burning and itching, and in every position in which he can possibly be placed, he irritates a part in a state of disease and high sensibility.

One of the most singular, and at the same time, one of the most universal concomitants of the eruption, when it exists in a violent degree, is a *sympathetic fever* of the arterial system. From much enquiry concerning this subject, among persons of every description ; from several cases which have fallen under my own observation ; and from a number of facts, which have been communicated to me by several very intelligent medical friends, I am induced to believe, that this sympathetic affection of the arterial system, occurs in a greater or less degree, in *every* case, in which the symptoms of the disease are violent.

When we consider, how frequently local diseases excite the sympathy of the arterial system, it must appear singular, that this should not have been generally noticed, by authors who describe this eruption, which in some instances, for a short period, is as vio-

lent in its symptoms as any other cutaneous disease whatsoever.

If it be demanded, by what symptoms and circumstances, the existence of this fever is proved ? I answer : 1. by the quick, frequent, full or tense *pulse*, which in violent cases universally prevails ;* 2. by blood drawn during the course of the disease, having been found fizy† and cup-formed;‡ 3. by loss of appetite and sickness at stomach ; 4. by a white tongue ; 5. by a burning of the palms of the hands and soles of the feet ; 6. by headach ; 7. by a throbbing of the temporal arteries ; and 8. by delirium.§

Most of these symptoms I have observed in several cases, that have come under my notice.

The time of the appearance of the fever, after the exposure to the cause of the disease, is various ; in cases of a less degree of violence, it is not excited till the eruption has made considerable progress, till the second, third or fourth day ; in violent cases it takes place very early in the disease.

After the detail of all these symptoms, it might properly be asked, whether or not, in some instances,

* Fontana, in his description of the effects produced by the R. toxicodendron on himself, seriously tells us : I had no fever, but my pulse was *very quick*.

† By Dr. Barton.

‡ Dr. Cooper.

§ Several other symptoms of fever occurred in a case communicated to me by Dr. C. Caldwell. See the Appendix.

death is produced by these injurious plants ? Several cases were communicated to me, in which the symptoms were so violent, that it was more probable that the disease would terminate in death, than in a recovery ; and it is very reasonable to suppose, that the extensive ulcerations might in some instances terminate in gangrene, or that the sympathetic fever might proceed so far, as to prove destructive to the life of the person affected. Although I never met with a case, in which this disease proved mortal, yet its possibility is rendered very evident by the violence of the symptoms in some cases : and that it is capable of producing death, appears likewise to be proved by the following quotation from a writer of credit. “In Pennsylvania I was assured by a number of reputable persons, that there were instances of persons having died in consequence of the bad effects of the *Rhus Vernix* ; and probably by neglecting the use of proper remedies.” Wangenheim.

There are several other symptoms of this disease, which on account of their singularity deserve to be described, though they appear less frequently, than most of those which have already been enumerated : they might be called with propriety *anomalous* symptoms.

1. A *periodical return* of most, sometimes of all the symptoms of the disease, about a year after its first appearance, without fresh exposure to the cause in

any manner. This periodical return occurs annually in some instances, for the course of four, five, or even ten years.

A number of cases of this periodical return have been communicated to me. Several I have observed myself. But no case establishes this singular occurrence in so unequivocal a manner, as the case of Dr. Barton. He was poisoned in the year 1785, near the Ohio; about a year after this, he went to Europe. In the year 1786, nearly at the same time of the year when he was first affected, most of the symptoms of the eruption returned: here there could not be the most distant suspicion of the poison being communicated to him by means of the atmosphere, or in any other manner. The eruption returned annually till the year 1790; at every successive attack it was less violent in degree.*

* There exists in many respects, a striking analogy between the *Rhus Vernix* and the *Anacardium occidentale*. The juice of the *Anacardium*, like that of the *Rhus Vernix*, produces an indelible black stain on linen. From its stem exudes a black liquor, which may be used for the purposes of varnish. Like the *R. Vernix* it produces an eruption on the skin, which, to complete our analogy, in some cases returns every year periodically. A remarkable instance of this was communicated to me by Mr. Josiah Coates, of Philadelphia, where the eruption returned for four or five years successively. The physician who had the care of it, employed with success in its cure, a *Salivation*. A similar case came under the notice of Dr. Physick, in which the eruption returned periodically, for several years. In another case of eruption, exci-

To account for this periodical return of the eruption, might furnish a subject for interesting speculation. But to speculate is at present not my intention. The poison generally is excited during the hot summer months. It is only during these months that the eruption re-appears spontaneously. I have never heard of its recurrence at any other period. During these months, from various causes, the irritability of the skin is considerably increased; and I believe, on inquiry of persons thus affected, we should find, that before the re-appearance of the eruption, they have by

ted by the oil of the cashew-nuts, in a young woman, who was lately attended by Dr. Physick, violent febrile symptoms supervened, which were relieved by bleeding; the blood drawn was *fizy*.

The *Hippomane Mancinella*, a celebrated poison-tree of tropical countries, is also in many respects similar to the *Rhus Vernix*. The milky juice contained in its bark, upon touching the skin, immediately raises watery vesicles. (Bankcroft's Hist. of Guiana.) And few drops falling from it are so caustic, as to blister the skin and produce dangerous ulcers. (Darwin's Bot. Gard.)

Several vegetables which are familiar to most persons, produce effects analogous to the *R. radicans* and the *Vernix*; though in an inferior degree. The effluvia of the *Nerium cleander*, produced in a case which came under Dr. Barton's notice, an extensive erysipelatous affection of the skin; the same has also followed the contact of the flowers of our *Broad-leaved-Laurel*, (*Kalmia latifolia*;) That an eruption of the skin is produced by the common *Rue* of our gardens, is almost generally known; and one case was communicated to me, in which an universal eruption was produced, by the berries of the *Rhus glabrum*.

means of exercise, or by other causes, produced a certain degree of increased action in the vessels of the surface of the body. May not then, with this increase of irritability, or of action, in the cutaneous vessels, a morbid action, similar to that which existed about an annual period before, (under analogous circumstances of every kind) be *associated* ; and by this association, an inflammation of the skin, resembling the poisonous eruption, be re-excited ? Dr. Rush ascribes, with much ingenuity, the recurrence of the paroxysms of the intermitting fever, to a certain association of ideas and motions. This eruption appearing periodically, might be called an annual fever of the cutaneous system.

2. In habits which are easily acted upon by the poison, if proper remedies are not applied early in the disease, or at least soon after the appearance of the vesications, they sometimes terminate in troublesome, lingering ulcers, resembling such ulcers, as are denominated phagedenic. These frequently are the source of immense pain and distress to the person affected, and if they finally heal, they are remembered by permanent scars.

3. The eruption is not unfrequently succeeded by a great number of small phlegmons or boils ; I have often observed this symptom. Dr. G. Willson informed me, that while one of his arms was affected by the common poisonous eruption, the other was covered with a number of small boils,

4. A swelling of the tongue, and an ulceration of the mouth, are in some instances very painful symptoms.

5. A swelling of the lymphatic glands. This symptom occurred several times in Dr. Barton's case, during the existence of the eruption ; he also noticed it in the case of a person, who after being poisoned by the *R. radicans*, applied to him for medical assistance.

6. After the disappearance of every other symptom of the disease, the patient is sometimes harassed, for many days, by a very disagreeable *itching*, which extends over the whole surface of the body.

In this place I shall relate the following two cases, the symptoms of which likewise differ from those that usually occur.

7. I had an opportunity of seeing a person at the alms-house of Philadelphia, in whom the poisonous eruption had been originally excited, by the smoke of the *R. radicans*. It did not make its appearance till two months after he was exposed to the smoke, when small vesications were seen on his shoulder, which were easily cured by very simple remedies. Twelve months after this, the disease returned upon the same part. The succeeding year it first appeared on his legs ; it travelled up his thighs to his arms and shoulders, and finally affected his back and face. This was in the month of May, 1797. The disease now

was in a state of ulceration; the ulcers, however, were superficial, and did not appear to extend beyond the skin; they very much resembled a certain cutaneous affection, which sometimes occurs in consequence of the venereal disease. His eyes were also affected at this time, by a ferous discharge, which was followed by a defective vision, in one of his eyes, and almost total loss of sight in the other. The blindness was relieved, by a slight salivation and by several other remedies.

8. A man labouring under an highly inflammatory fever, was bled by a person who had handled the Rhus Vernix, but who had used the precaution, after detaching the resinous juice adhering to his hands by spirit of wine, to wash them repeatedly with soap and water. About forty-eight hours after the venæsection, a red eruption and several ferous vesicles, appeared above the place where the vein had been opened by the lancet; these upon examination were found to be the poisonous eruption. This eruption rapidly extended over the whole arm, and some of it appeared on the arm of the opposite side. The scrotum was also covered by the eruption and by vesications. The most remarkable phenomenon of this case was, that during the exacerbation of the fever, the eruption and vesications very sensibly increased, and the scrotum was perceptibly tumefied, while they

almost entirely subsided during the intervals between the paroxysms.*

The different methods in which the poison is generally communicated, were formerly mentioned; there remains, to enumerate a few symptoms, which are produced by several of the different methods of communication.

1. When the smoke of the Rhus Vernix is the exciting cause, its effects generally resemble those produced by other causes; but when it has been very powerfully applied, symptoms of a different nature have been produced: this appears from the following fact, communicated to the Philosophical Society of London, by Dr. Sherard. "Some people had cut some of the Rhus Vernix for fuel, which they were burning; in a short time they lost the use of their limbs, and became stupid; so that if a neighbour had not accidentally opened the door, and saw them in that condition, it is generally believed, they would soon have perished."

2. Desirous of knowing the effects of the *juice* of the R. Vernix on myself, I applied a considerable

* This case would serve to prove, if any proof were required, that the poison acts in the first place locally on the cutaneous system: the patient at the time of its application laboured under a violent affection of the arterial system; that two general affections of one system (for instance the arterial, nervous, &c.) cannot exist at the same time, is I believe, at present almost universally admitted.

quantity of it to the back of my left hand. This was done while I was standing near a tree, from which the juice flowed after making an incision through the bark. A slight pungent pain was felt immediately after the application, resembling that produced by the emplastrum cantharidum. The spot soon assumed a black colour, and became somewhat elevated; this elevation gradually increased; it was accompanied by a constant sensation of fulness and heat. In twenty-four hours, the whole spot was covered by a large vesicle, which on being punctured discharged a viscid, serous fluid: a scar is yet to be seen where the juice was applied.

3. It was mentioned, in a preceding part of this dissertation, that Dr. Barton had excited the eruption by inoculation: a very small quantity of the juice of the *Rhus Vernix* was introduced by a slight puncture, between the cuticle and skin of his left hand. In thirty-six hours, an itching and tumor were perceived in that spot, and soon afterwards symptoms of the eruption and slight vesications appeared on different parts of the body; it produced likewise, a slight swelling of the axillary gland of the left arm, the usual affection of the scrotum, and an universal itching. Its progress was checked by a remedy, which will be mentioned in its proper place.*

* I have in several instances, and in habits which were very susceptible of the poison, attempted to propagate it, by inoculation with the serous fluid contained in the vesicles; but in no instance was I able to excite the infection.

The following case was communicated to me by my very ingenious friend Dr. S. Cooper. "On Monday, about twelve o'clock, I was inoculated on my wrist, with some of the juice of the Poison-vine. The next morning when I awoke, my eyelids itched and were redder than natural. In the afternoon this symptom became worse, my face began to itch, swell and look red, and my scrotum and prepuce were affected in a similar manner. The part where I was inoculated, now began to inflame. During the existence of the preceding symptoms, I experienced frequent flushings of heat through my whole body ; and my pulse was unusually quick and frequent. Vesicles were hindered from forming about my eyes and face, by often applying ice to these parts. Vesicles arose on the scrotum, on each wrist and hand, and on my feet and legs. In about eight days time the whole affection disappeared. Much cuticle came away from my face."

Concerning the CURE of the DISEASE, produced by the
RHUS RADICANS and VERNIX.

From a review of the causes and symptoms of this disease, we shall easily be led to a proper method of cure. It is produced by an highly ^{ir}ritating cause ; in every instance an inflammatory affection of the skin exists, and in many cases it is attended by an inflammatory fever of the whole system. Reasoning there-

fore from its causes and symptoms, I shall not hesitate to recommend such remedies, as are generally known to relieve inflammatory affections. These are chiefly evacuants. But another class of remedies, which act locally on the part affected, is necessary ; these remove the existing morbid action, by exciting a stronger action in the diseased part. The application of these remedies to this disease, and to many others, has been rendered very obvious, by the clear and comprehensive therapeutical rules, which are taught in this university, by the excellent professor of the Institutes and Clinical medicine.

The remedies are naturally divided into 1. such as act *generally* in the whole system, and such as 2. are applied *locally* to the parts affected. Of the former I shall recommend Bloodletting, Purging, Cold in the form of ice, cold water or cold air, and Mercury given with the view of exciting a salivation.

1. *Bloodletting*. This remedy has lately been used, with singular success, by Dr. Barton and Dr. Cooper of this city, and by Dr. Stocket of Maryland.* The appearance of the blood drawn, was mentioned in a former part of this essay. In violent cases it should never be omitted, and in moderate cases it will shorten the course of the disease, and render the symptoms less distressing.

* It was also employed, with good effect, in a case communicated to me by Dr. C. Caldwell,

2. *Purging*. This remedy, especially in cases accompanied by much inflammation, should always be used in conjunction with the last remedy: It may be particularly useful in such cases, where from the extent of the tumefaction or ulceration, bloodletting is rendered impracticable. In these cases this remedy will be one of our chief resources.

Under this head is to be ranked: copious drinking of *Sea-water*. This was used in a case communicated to me by Mr. Samuel Coates, in which the disease returned several years periodically, and resisted all the remedies that were applied, until the patient was sent to the sea-shore, where it soon yielded to sea-bathing and plentiful potations of *sea-water*, which produced very copious and continued evacuations from his bowels. Wherever this is convenient it may be an excellent remedy. The analogy between these poisons and the Mancinella, was mentioned in a former part of this essay. It is confirmed by the following circumstance. Bancroft (in his Hist. of G.) tells us, that in the bad effects produced by the Mancinella, *Sea-water*, and the juice of limes, &c. are effectual remedies. A remedy which is used in the cure of the eruption, occasioned by the Rhus Vernix of Japan and China, produces violent *purging*.*

* Dabhalde's History of China,

3. *Cold*, whether applied in the form of ice, of cold water or cold air, is an excellent palliative of all the symptoms, in the early stage of this disease. It particularly relieves the itching, which in some cases is very distressing, and it often retards or entirely prevents the tumefaction. A person who is very susceptible of the poison, informed me, that a very cold bath relieved all the symptoms and entirely checked the progress of the disorder. Dr. Cooper derived great benefit from the application of ice to his face; and in my own case every symptom was soon relieved, by the use of this excellent remedy. Kalm likewise used this remedy with advantage. It was remarked formerly, that the eruption is less easily excited in cold than in warm weather.

4. In violent cases, where the symptoms of the disease run high, and where the patient's life may be in danger, I recommend with great confidence, the internal use of *Mercury* with the view of exciting a salivation. From its almost specific effect in all cutaneous diseases, we may also in this instance, expect much from this powerful remedy. I formerly mentioned a case of erysipelas produced by the *Anacardium occidentale*, in the cure of which it was used with success.

2. Topical Remedies.

The first and most powerful of these, is a solution of *Corrosive sublimate* in water. This remedy was

first employed by Dr. Barton in his own case, and by him it has been recommended to several other persons: from the success which has uniformly attended this remedy, in every case in which it was used, he is led to believe, that it may be employed in the cure of this eruption, with as much certainty and probability of success, as it is in many other diseases. The application of the solution, very soon excites a specific inflammation of the skin in the parts affected, which at this time are in a state of great excitability; this inflammation is of greater force than that produced by the Rhus, which it counteracts or destroys.* It soon allays the itching, accelerates the suppuration of the vesicles, if any have formed, and brings on a desquamation of the purulent crust, or in moderate cases, of the cuticle. But, its effects are not topical alone; in all persons that are easily acted upon by mercury, it produces a salivation; this happened in Dr. Barton's case.†

* Dr. J. Otto informed me, that a friend of his had in several instances, removed the eruption in a short time, by the application of the spiritus sal. ammon. diluted with water: this acts in a manner similar to the solution of corrosive sublimate.

† The Ungt. mercur. precip. rubr. is used in some parts of Pennsylvania in the cure of this eruption; it is called by the inhabitants of the country, *Poison-salve*. In the case which occurred in the alms-house of Philadelphia (see p. 39) it assisted in the cure of a number of chronic ulcers produced by the R. radicans. It is an excellent remedy in these cases.

2. In moderate cases I have applied with very considerable advantage, an ointment prepared by mixing one dram of *saccharum saturni* with one ounce of *Unguentum simplex*. My friend and fellow graduate Mr. P. G. Prioleau informed me, that upon being poisoned by the *R. radicans*, particularly on his hands and arms, after using several remedies with little effect, he was cured by the application of a solution of *saccharum saturni*. It was also used in conjunction with the *Ungt. mercur. precip. rubr.* in the case related p. 39, with considerable advantage.

3. The *Unguentum simplex* of the dispensaries, sweet oil, and emollient cataplasms, should be applied in all cases, where in consequence of neglect in the beginning, tedious and ill-conditioned ulcers remain. Whenever their cure is much protracted, mercury should be exhibited internally.

With these remedies, general and topical, regulated according to the existing stage of the disease, and accommodated to the constitution of the patient, and the condition of his system, I believe it will never be difficult, to bring the disease to a fortunate termination.

I shall now enumerate a few of the remedies, which are most generally used by the inhabitants of the country; among whom, from evident reasons, this disease is most frequently met with.

The leaves of the *Datura Stramonium*, *Houfseleek* (a species of *Sempervivum*) the expressed juice or a

decoction of the roots of the *Sanguinaria canadensis*,* cream and water, and a solution of common salt or of copperas in water. All these are applied externally, and may be very proper in moderate cases : but they are superseded by the more effectual remedies, above enumerated.

More violent, but less commendable are : salt dissolved in hot soap-suds, brandy, spirit or urine. Which have all been used externally.

Soot dissolved in milk is taken by some persons ; perhaps it acts as a cathartic ?

Under this head are to be mentioned several other remedies, which formerly were very celebrated. Of these I can say nothing from my own experience.

1. The leaves and wood of both species of *Rhus*, burnt to ashes and rubbed on the parts affected : this has been said to be very effectual in curing the disease.

2. Kalm, in his travels, observes : “ Some people assured me, that a person suffering from ^{the} noisome exhalations of these plants, would easily recover, by spreading a mixture of the wood burnt to charcoal, and hogslard upon the swelled parts.” †

Wangenheim says : “ If the poison exists in its highest degree of violence, the ashes of the wood,

* This is used by the country people in all chronic ulcers.

† Dr. Barton has been informed, that an empiric near Lancaster, uses an ointment prepared with the charcoal of the *R. radicans* and hogslard, with great success, in the cure of the itch.

prepared in a close vessel, is used in its cure ; an ointment is made of it with lard, with which the affected parts are anointed."

EXPERIMENTS *on the* RHUS GLABRUM.

Experiment 1. About two pounds of the fresh berries of the *Rhus glabrum*, were infused twenty-four hours in a gallon of hot water ; the infusion had an agreeable acid taste ; it was evaporated almost to the consistence of a syrup, and exposed in a cool place to crystallize. Nearly twelve drams of impure crystals of a reddish brown colour were obtained : their form was oblong or cuboidal, and by repeated solution and evaporation, they were rendered perfectly clear and pellucid. They appeared very analogous to crystals of tartar ; and the following circumstances, tend to prove their complete identity with that saline substance.

1. Their taste very much resembled the taste of cream of tartar ; it was however more truly acid, devoid of the earthy taste which always accompanies that salt, and which may be owing to the aluminous earth by which it is clarified, or to calcareous earth with which it appears sometimes to be adulterated. Perhaps the crystals obtained from the *Rhus*, contain a greater proportion of acid. 2. The superabundance of tartareous acid was rendered very evi-

dent by a violent effervescence, which took place on adding a small quantity of potash to a solution of these crystals. Their analogy to crystals of tartar is further proved : 3. By their difficult solubility in water ; 4. By being rendered much more soluble by the addition of a little borax ; and 5. By a slight red colour, which they produce on blue vegetables.*

The *Gallic acid* has been found to exist in every species of *Rhus*, which has hitherto been examined by the chemist. I have met with it in different proportions, in several of our native species of this genus, in the *Rhus Vernix*, *R. radicans*, *R. typhinum*, *R. copallinum*, and especially in the *R. glabrum*. And we may very probably suppose from analogy, that it will be found in a greater or less degree, in every species of this genus.† It appears from the following experiments, that this acid exists in different proportions in different parts of the same species : no part of the plant, however, is entirely destitute of it ; I have found it in the flowers, the leaves, the bark, the seeds and even the root. The relative quantity contained in the different species, is very various : from the few trials I have made, the result of which requires much further confirmation, I suppose they may be ranked in the following order : the *Rhus gla-*

* A solution of these crystals, produced in lime-water and in a solution of the acetite of lead, a white precipitation.

† It exists plentifully in the *Rhus coriaria* and *cotinus* of Europe.

brum contains most, next the typhinum, copallinum, Vernix and radicans.

As the *Rhus glabrum* appeared to contain the gallic acid in the largest proportion, and as it was procured with more facility than any of the other species, I subjected it to the following experiments.

Experiment II. The infusion of the leaves, after a short exposure to the air, is of a light brown colour; the infusion of the berries is of a beautiful crimson colour.

Experiment III. To a pint of pure water, in which one grain of sulphate of iron had been dissolved, one drop of an infusion of one ounce of the leaves in a pint of water, was added: a slight greyish blue discoloration soon took place, which in twenty-four hours became more perceptible; if to the same solution three drops were added, the water soon assumed a purple colour.

Experiment IV. If to half an ounce of the infusion of one ounce of the fresh berries in a pint of water, one drop of a solution of sulphate of iron is added, a black precipitation takes place which is immediately re-dissolved; if even three or four drops are added, still the liquor remains transparent: but if now a few drops of a solution of potash are added, a deep black colour is instantly produced.

Experiment V. If to half an ounce of the infusion of the leaves, of equal strength with that of experiment the third, one drop of a solution of sulphate

of iron is added, the liquor immediately assumes a black colour : but, if to the same quantity, previously one drop of diluted sulphuric acid is added, the black precipitation, as in the last experiment, is again re-dissolved, until the acid is ~~neutral~~^{cut} by the addition of a few drops of a solution of potash. This experiment was repeated with the same result, with an infusion of galls.

Experiment VI. To determine the relative quantity of gallic acid contained in the *leaves* and *berries* of this species of *Rhus*, I infused one ounce of each, in half a pint of water, and to equal quantities of both infusions, I added a scruple of sulphate of iron. Characters written with the infusion of the leaves were nearly black, while such as were written with the infusion of the berries were only brown. With a view to neutralize the tartareous acid of the berries, I added a few drops of a solution of potash, an effervescence took place, but the blackness of the infusion was not increased.*

Experiment VII. To determine the relative quantity of gallic acid contained in the *R. glabrum*, and in *galls*, I infused an ounce of the leaves, berries and galls, each separately in a pint of water ; to equal

* Small quantities were first added and these were gradually increased ; but though by a very small quantity the colour of the infusion was not impaired, yet, when it was increased, a dirty brown colour was always produced.

quantities of these infusions, I added a scruple of sulphate of iron. Characters written with the infusion of the berries, were as in the last experiment, considerably paler than those written with an infusion of the leaves; while between such, as were written with the infusion of the leaves and of galls, I could not discover the least difference in point of blackness; nor could several of my friends to whom they were shewn.

Observing the blackness produced in the last experiment by the sulphate of iron in an infusion of the leaves, I was induced to believe, that by a due proportion of the relative quantity of the leaves of the R. glabrum and of sulphate of iron, they might be used advantageously in the preparation of *ink*; to determine this, the following experiments were instituted.

Experiment VIII. My first trials were made with the berries; six drams of these, two of sulphate of iron, and one of gum arabic, were infused in half a pint of water. The ink obtained in this manner, as might readily be expected from the result of the sixth experiment, was of a brown colour. It was not improved by the addition of potash. By taking a larger proportion of berries the blackness was somewhat increased.

Experiment IX. I infused six drams of the leaves, two drams of sulphate of iron, and one of gum arabic

in half a pint of water ;* by this infusion I obtained a very good ink, equal in point of blackness, to our common writing ink.

Experiment X. To determine more accurately the degree of blackness of this ink, I made a relative trial with exactly the same quantity of galls. The blackness of characters written with both, after having been kept for four months, was so nearly alike, that by the nicest examination I could scarcely perceive any difference : they were shewn to, and examined by several persons, who were of opinion, that no difference existed between them.† If a greater proportion of leaves to the other ingredients was used, the intensity of the blackness of the ink was considerably increased.

The preceding experiments indicate the presence of a considerable quantity of gallic acid ; to establish more fully the identity of the *Rhus glabrum*, with those vegetables, which are commonly called *adstringent vegetables*, I made the experiments which immediately follow.

* These are the proportions recommended by Mr. Lewis.

Phil. Commerce of Arts.

† When this ink was first prepared (with the *R. glabrum*) and a few days afterwards, it had a slightly brownish hue ; this disappeared in my specimens, after being kept a few weeks ; the ink prepared with galls, as is well known, has when recent, a bluish cast.

Experiment XI. To a very strong, filtered infusion of the leaves, a small quantity of a solution of potash was added; a very copious yellowish precipitation soon took place; the addition of potash was continued till no more precipitation ensued: after some time the supernatant liquor was poured off, and a few drams of sulphuric acid were added to the precipitation, by which it was instantaneously dissolved.*

Experiment XII. If to an infusion of the berries, the solution of potash was added, a violent effervescence took place, which was owing to the tartareous acid of the berries; (Exper. i.) by increasing the quantity of potash, a precipitation ensued, as in the last experiment, which was very soluble in sulphuric acid.

Experiment XIII. After saturating about two pints of the infusion of the berries with potash; half an ounce of diluted sulphuric acid was added to it: the liquor then was suffered to evaporate spontaneously. In about two months a number of crystals were formed, resembling those of sulphate of potash.

Experiment XIV. To the clear supernatant liquor, remaining in the twelfth experiment, small quantities of sulphuric acid were added; a precipitation took place, which being dried, by forming a dark brown tincture with alcohol, exhibited evident signs of the presence of a resin, which however exists only in small quantity.

* The precipitation was insoluble in water and in alcohol.

Experiment XV. In the supernatant liquor of the twelfth experiment, a solution of sulphate of iron produced a black precipitation; the oxygenated muriate of mercury, and the muriate of barytes, produced a precipitation of a brown colour.

Experiment XVI. The precipitation produced by potash in the infusion of the leaves, is readily soluble in the sulphuric acid; (as appears from the XIth Experiment) but, by the addition of potash, ammoniac, or a solution of borax, it is again precipitated. By spontaneous evaporation of this solution, an highly astringent, gummy substance is obtained, which being dissolved in water, is readily decomposed by potash or by muriate of barytes.

Experiment XVII. The infusion of the berries concentrated by evaporation, produced in a solution of silver in the nitrous acid, a white, and in a solution of mercury, a yellow precipitation; in a solution of the acetite of lead it produced a white precipitate; in lime-water and the oxygenated muriate of mercury a grey precipitate; and in a solution of sulphate of potash a brown precipitate.

Experiment XVIII. About two pounds of the berries, recently collected, were digested several days in a gallon of water; the liquor was then filtered, evaporated to a pint and one ounce of quick-lime gradually added to it; having digested twenty-four hours, the calcareous sediment was collected, and

frequently washed with warm water ; one ounce of diluted sulphuric acid was now poured upon it, and after some time the liquor was poured off, evaporated to a pellicle, and exposed to crystallize. About two drams of long, slender, four-sided crystals were obtained.* These crystals did not effloresce in the air ; dissolved in water they produced a copious milky precipitation in lime-water and in a solution of the acetite of lead.

Experiment XIX. On half an ounce of the berries of the *R. Glabrum*, I poured five ounces of strong nitrous acid ; a large quantity of nitrous gas was disengaged ; a moderate degree of heat was applied for several hours ; the remaining fluid was then poured into a plate, and in a short time a large number of delicate, needleform crystals were produced. A solution of these crystals, caused an instantaneous milky precipitation in lime water and in a solution of the acetite of lead ; in a solution of sulphate of zinc or copper, a white precipitate was produced. These crystals effloresced when they were exposed to an air of a moderate temperature.

On a repetition of this experiment, I obtained some crystals of the same form with those just described, and others, of a quadrilateral form, terminated by dihedral summits ; the former of which effloresced in the air.

* I obtained at the same time, a few very minute crystals of the sulphate of potash.

Experiment XX. By treating half an ounce of the extract of *R. Glabrum*, with five ounces of nitrous acid, I obtained lamellated and oblong crystals, which possessed all the properties of those described in the last experiment.

When these crystals are thrown into water, an evident crackling noise is heard; this is peculiar to this salt, and is ascribed by Fourcroy to a sudden breaking of its particles.

Experiment XXI. About three pounds of the leaves of the *Rhus radicans* were infused in brandy; after being boiled a few minutes, they were exposed in a moderate temperature. At the end of several months, this infusion was found converted into very strong vinegar; it resembled that which is obtained from cyder, exceeding it however in strength. Its taste was very pungent, and it retained some of the peculiar odour of the plant. On adding a little potash to it, a violent effervescence took place.

Experiment XXII. To two pints of a strong infusion of the berries of the *Rhus glabrum*, some chalk, and a small quantity of weak spirit of wine was added; the mixture was then exposed in a vessel slightly stopped, in a moderate temperature. In the course of three or four months, vinegar was produced, which resembled that generally used for culinary purposes; some of it being added to a little potash, produced considerable effervescence.

OBSERVATIONS *on the preceding* EXPERIMENTS.

By the first experiment a considerable quantity of semisaturated tartarite of potash was obtained. In order to succeed with this experiment, it is necessary to collect the berries while they are in a state of entire perfection, and covered with the white saline substance, which was described in the history of the growth of the plant; if this is not attended to, the salt is dissolved by the rain or moisture, to which the plant is frequently exposed. I have endeavoured to establish the identity of this salt with crystals of tartar, by a few simple but apparently conclusive experiments and analogies. Mr. Hermbstædt obtained a similar salt from the berries of the *Rhus coriaria*,* which has been analysed by Mr. Tromsdorf:† I regret that I had not an opportunity of seeing this analysis. This salt, Mr. William Bartram informed me, exists in much larger quantity, on the berries of the *Rhus copallinum*; it is used in the preparation of punch, and in his opinion, is nearly equal to the juice of lemons, for that purpose.

To determine, with the utmost degree of precision, the relative quantity of gallic acid, contained in different parts of the *R. glabrum* and in galls, was

* *Physikalisch-chemische Beobachtungen.* pag. 210.

† *Crell's annals.* 1787.

the object of the third, the sixth, and seventh experiments ; the result is obvious, and will be applied more particularly under the subject of ink.

In the fourth experiment, we observe the black precipitation produced by sulphate of iron in a solution of the berries, to be immediately re-dissolved ; from a review of the first experiment, this circumstance admits of very easy explanation ; the tartareous acid, which exists in the berries in large proportion, re-dissolves the iron and holds it in solution, by which means the effect of the gallic acid is directly counteracted. This is rendered still more evident, by the immediate black precipitation which ensues, when the tartareous acid is neutralized by potash.

In the fifth experiment, the action of the tartareous acid is imitated by the addition of a little sulphuric acid ; the result of this confirms the observations that were made on the last experiment.

From the result of these experiments, we can draw an important practical inference, with regard to the use of the *R. glabrum* in the art of dying. It is very common in many parts of this country, to employ the berries in preparing a black dye for hats and for other substances ; from a comparison of the fourth and fifth, with the sixth and seventh experiments, it appears, that they are much less adapted to this purpose than the leaves, which I shall recommend hereafter. Although the tartareous acid be neutralized

by potash, yet, as it is impossible to regulate the proportion of potash so exactly, as not to saturate at least a part of the gallic acid also, the colour in this case is by no means so black, as that produced by the leaves ; but it is generally of a rusty brown hue.

In the eighth, ninth and tenth experiments, my object was to determine the probable utility of the *Rhus glabrum* in the preparation of *ink*. In the eighth, the berries alone were used ; the ink produced by these (according to the fourth and sixth experiments) was of a brown colour. The result of the ninth and tenth experiments, not only fully answered, but even in some degree, exceeded my expectations. The quality of the ink which they afforded, and the relation they bear to that prepared with nut-galls, has been mentioned in the ^e account of those experiments. The qualities, and the principles of the formation of ink, have always been considered as a matter of importance. Chemists of the first reputation, have at different times been engaged in the investigation of this subject. Among the number of those who have cultivated it with most success, are Mr. Lewis and Dr. Woodhouse. The experiments of Mr. Lewis were conducted with great accuracy and ingenuity ; his observations on this, and on several other subjects, relative to chemistry and natural philosophy, deserve the attention of every man of science : he may be said to have carried the *practical* part of the subject of

ink, to a very high degree of perfection: but the *theory* was more satisfactorily established, by the clear and decisive experiments of Dr. Woodhouse.* It is not my intention to detail the facts and experiments, on which this ingenious theory is founded. My object is, to recommend the use of the leaves of the *R. glabrum*, as a substitute for nut-galls, in the preparation of ink. From the promising result of several of the preceding experiments, I am led to do this with confidence. Galls are procured with considerable expense, while the *R. glabrum* grows in abundance in almost every part of the United States; and in addition to the facility with which it is procured, it may always be had in a state of perfection, and not, as is

* In Nicholson's Chemical Dictionary, we find an extract from a series of experiments, on the subject of ink, by a French gentleman of the name of Ribaucourt. Although his experiments are numerous and ingenious, they don't discover that simplicity and pertinence, which characterizes the experiments to which I above alluded. He considers the precipitate, produced by alkali in an infusion of galls, as a calcareous earth; and finally infers from his experiments, that in the formation of ink, the calcareous earth of the galls unites with the vitriolic acid of the vitriol, and forms selenite, most of which falls down with the first precipitate, on account of its insolubility in water; while the calx of iron combines with the colouring matter of the galls, and forms the black fecula which subsides more slowly.

frequently the case with galls, injured by age or decay.*

But not only in the preparation of ink, do I wish to recommend the use of the *R. glabrum*; the sixth and seventh experiments, in addition to those which have just been mentioned, point out its utility for several other purposes. In the art of *dying black*, immense quantities of galls are now consumed, which are purchased at a very high rate. A few trials, I believe, would convince our artists, that the leaves of the *R. glabrum*, might entirely supply the place of galls.†

For the purposes of *tanning*, several species of *Rhus*, which are very analogous to our species, are cultivated in many parts of Europe: the *R. coriaria* in Turkey, Germany, Spain and France, the *R. cotinus* in Italy.‡ Our own forests are sensibly con-

* The ink produced by the *R. glabrum* resembles that made with galls, not only in its degree of blackness; but, the precipitate of the iron, likewise remains easily suspended in the menstruum, by the addition of gum arabic, and does not, like that prepared with astringent vegetables containing much resin, concrete into large particles.

† If it should be found in trials in the large way, that the quantity of gallic acid contained in the *R. glabrum*, is not quite equal to that of galls, this defect may very easily be remedied, by employing it in greater proportion.

‡ Smith's Tour.

fumed; our oak-trees will soon be exhausted. To what vegetable then, for a substitute, can we so readily resort, as to the *R. glabrum*? It grows plentifully in most parts of the United States, and where it is deficient, it may easily be cultivated; its growth is rapid, and while in a very young state,* it answers all the purposes of this art.

I have thus endeavoured to point out the probable utility of the *R. glabrum* in several of the most useful of our arts. The further investigation of this subject, especially on a larger scale, is requisite. I wish it to be considered, not merely as a matter of philosophical curiosity. It deserves attention not only in a local or individual point of view, but its application may become of a more extensive nature. I have no doubt, that at a future period, the cultivation or preservation of this plant, will be considered an object of general, of national policy.

The analysis of adstringent vegetables has of late been effected with great accuracy: in the eleventh and several of the succeeding experiments, (12, 14, 15 and 16) it was my design to shew the similarity of the *R. glabrum* to several of the most powerful of this class. The reader will perceive, that most of

* The shoots of the *R. coriaria*, are cut down every year, quite to the root; and after being dried, they are reduced to powder by a mill, and thus prepared for the purposes of tanning.

Nichol. Chem. Dict.

them were suggested by the experiments of Dr. Woodhouse ;* whose accurate analysis of the *Perfimon* has added much to our knowledge of the subject of vegetable adstringency.

In the eleventh experiment, the alumine, one of the constituent parts of adstringent vegetables, was precipitated from a strong infusion of the leaves, by a solution of potash : one of the chief characteristics of this precipitate, is its ready solubility in sulphuric acid. The result of the twelfth experiment concurred with that of the last, after the tartareous acid of the berries was saturated. The quantity of resin contained in the *R. glabrum*, appears to be very minute. Exp. 14. In the sixteenth experiment, by the re-union of the alumine, precipitated from an infusion of the leaves, and sulphuric acid, a liquor was produced, which possessed all the properties of a solution of the common sulphate of alumine. In reviewing these and the preceding experiments, we find in the *R. glabrum* all the component parts of adstringent vegetables : a small proportion of *resin*, and a considerable quantity of *gallic acid* and of *alumine*.

In the thirteenth experiment, the sulphuric acid, in consequence of its greater affinity, appeared to unite with the potash of the mixture, while the tartareous acid was separated. The precipitations produced in the seventeenth experiment, resemble those that are

* Inaugural Dissertation, 1792.

produced in the same solutions, by the crystallized acid obtained from the nut-gall.

The design of the eighteenth and several of the succeeding experiments, was different from those we have already discussed. In the eighteenth, by the process invented by Scheele for obtaining the pure tartareous acid from crystals of tartar, I obtained an acid, which appeared to possess all the properties of the tartareous acid. I found it of importance to employ quick-lime in this process ; with common chalk the experiment did not succeed. This experiment affords additional proof, to what was said in considering the first experiment, of the nature of the salt obtained by lixiviation from the berries.

By subjecting the berries and extract of the *R. glabrum* to the action of the nitrous acid, according to the process generally employed for procuring the oxalic acid, I obtained crystals of different kinds : some upon examination appeared to possess the properties and form of the oxalic, while others more exactly resembled the tartareous acid. The affinities of these two acids to earthy and to other substances are so nearly alike, that I have found it somewhat difficult to distinguish between them. One of the most evident marks of distinction appeared to be the circumstance, that the oxalic acid generally effloresced in a warm temperature, while the tartareous did not. It is not difficult to conceive, that by the same process

these two acids should be procured. *Hernbstædt* obtained from sugar by weak nitrous acid, tartareous, by strong, oxalic acid. The oxalic differs from the tartareous, merely in being more highly oxygenated; it is in fact the most oxygenated of all vegetable acids. This is one instance among innumerable others, of the ready convertibility of one vegetable acid into another; the analogy between many of these acids is so great, that they are considered by several chemists as fundamentally the same. Among the most respectable characters who entertain this opinion, are *Westrumb** and *Hernbstædt*,† two German chemists; the former contends that the acetous is the only elementary vegetable acid, while the latter considers as such exclusively the tartareous. On reviewing their labours, every person will admire their perseverance and ingenuity: but neither of them has yet been able so far to extend or generalize his experiments, as to establish his hypothesis.

In the twenty first experiment, by the infusion of the leaves of the *R. radicans* in brandy, after exposure for several months, an excellent vinegar was produced. Different species of *Rhus* have long been employed in the preparation of vinegar. I have been informed by the gardener of the Pennsylvania Hospital, who has several years resided in Canada, that

* *Keir's Chemical Dictionary.*

† *Physikalisch-chemische Beobachtungen.*

the French inhabitants of that country about Montreal, prepare a very good vinegar from the berries of the *R. glabrum*. The berries are boiled in water, and afterwards exposed in a cask to the heat of the sun, in order to ferment. “The young germen of the fruit of the *R. typhinum*, when fermented, produces vinegar; hence it is called *vinegar tree*.” Encyclop. Both these species grow abundantly in many parts of Pennsylvania, where they might be collected, fermented, and afford cheap and excellent vinegar.

By the twenty-second experiment, vinegar was likewise produced; in this instance, was not the tartareous acid of the berries gradually converted into the acetous?

Concerning the USE of several species of RHUS, in the art of DYING.

Experiment I. The fresh leaves of the *Rhus radicans*, broken off from the plant, exude a liquor of a white milky appearance; this liquor applied to flannel, to muslin or linen, imparts to them, after being a short time exposed to the light, and especially to sunshine, an intensely black colour. Applied to paper it stains it black in the same manner. The liquor when first applied, is scarcely visible, it resembles a spot of oil, but gradually becomes yellow, red, brown, and finally black. This black stain cannot be washed

out by means of alcali or soap. It does not fade on exposure to the air. Alcohol appears to have no action upon it. If leaves or branches are broken off and exposed to the air, the juice exuding from their ends, likewise becomes black; in this case the colour has a more glossy appearance.

Experiment II. In order to obtain this elegant black juice, for the purpose of fixing it on flannel or linen, I pounded some of the stalks which appeared to abound with it, and expressed their juice; but I obtained merely a greenish liquor, the black colouring matter appeared to be absorbed by the pith of the stalks. I have tried a variety of methods, to extract or separate this black colouring matter, which exudes from every part of the plant, but with none have I, as yet, been able to succeed.

Experiment III. In a strong filtered decoction of the fresh leaves of the *Rhus radicans*, I boiled for the space of an hour, a small piece of flannel, muslin, linen and silk. It imparted to flannel and silk a dark fawn colour, which after the stuffs were once washed in soap and water, was permanently fixed. Linen and muslin had scarcely taken up any of the colouring matter.

Experiment IV. In a decoction prepared in the same manner, (as in the last experiment) I boiled small pieces of flannel, muslin and linen, after having previously steeped them in a strong solution of sul-

phate of alumine. The flannel was died of a dark yellow colour, which was permanently fixed. With linen and muslin the success was not better than in the last experiment.

Experiment V. In a decoction, similar to that used in the third experiment, after adding a little vinegar, I boiled small pieces of flannel, muslin and linen; they acquired a dirty brown colour: with small quantities of the nitrous or sulphuric acid, the result was nearly the same.

Experiment VI. To separate portions of the decoction of the third experiment, I added small quantities of nitrate of potash, muriate of soda, potash and urine: the stuffs were impregnated with a brown or greyish colour; but neither of these promises the least utility in dying.

Experiment VII. In a decoction of the leaves of the *R. radicans*, prepared with the addition of one fourth part of spirit of wine, I boiled a piece of flannel which had been soaked in a solution of alum; it acquired an elegant pale yellow colour.

Experiment VIII. In the simple decoction of the leaves and bark of the *Rhus Vernix*, a piece of flannel acquired a pale fawn colour; and

Experiment IX. A piece of flannel, having been steeped in the solution of alum, acquired a very brilliant yellow colour.

Experiment X. With the fresh bark of the *Rhus glabrum*, a strong decoction was prepared, in which

small pieces of silk and flannel were dyed of a yellowish fawn colour; which on silk appeared more elegant, than that of any of the former simple decoctions.

Experiment XI. In the same decoction, a piece of flannel and silk, after being impregnated with a solution of alum, acquired a very handsome permanent yellow colour.

Experiment XII. In a decoction of the *leaves* and stalks of the *R. glabrum*, a piece of flannel and silk having been steeped in a solution of alum, acquired a yellow colour, resembling that of the last experiment.

Experiment XIII. In a strong decoction of the *R. radicans*, in which a certain quantity of sulphate of iron was dissolved, I boiled repeatedly a piece of blue woollen cloth; it acquired a deep black colour.

REMARKS on the preceding EXPERIMENTS.

The *black juice* which flows from several species of *Rhus*, on wounding their stem or detaching their leaves (experiment 1.) has long attracted the notice of naturalists. *Kämpfer* appears to have been the first, who described the juice distilling from incisions into the *R. Vernix*.* *Lawson*, in his natural history of Carolina, published in the year 1709, has the follow-

* *Amœnitates exoticæ*.

ing passage : “ The juice of the Poison-vine will stain linen, never to wash out. It marks a blackish blue colour, which is done only by breaking a bit of the vine off, and writing what you please therewith.”* In 1755 the *Abbé Mazeas* communicated to the Philosophical Society of London several experiments, which he made on suggestion of the Abbe Sauvages, with three different species of *Rhus* : † He mentions having produced a brown stain on linen with the juice of the *R. Vernix*, while with the juice of another species, which he calls *Hedera trifolia Canadensis*, he produced a deep and permanent black. The latter of these plants, from his description, evidently appears to be the *R. radicans*.‡ This supposed discovery of the *A. Mazeas*, was the cause of the controversy between Mr. P. Miller and Mr. I. Ellis, which was mentioned in the description of the *R. Vernix*.

Since the time of the *Abbé Mazeas*, this subject has been attended to by several persons, and among others, by the ingenious Mr. Lewis : hitherto their labours have not been successful in extracting or separating the black juice, for the purpose of fixing it on linen. The subject deserves to be further investigated.

* He adds : “ I have thought, that the East-India natives set their colours, by some such means, into their finest callicoës.”

† London Philosophical Transactions, v. 49.

‡ The stain produced by the *R. Vernix*, I have always observed, to be less black than that produced with the *R. radicans*,

It is supposed by some persons, that the Indians of North-America make use of the *R. radicans*, in staining different substances of a permanent black colour.

The circumstance, of the immediate change of the colour of the juice from white to black, upon exposure to atmospheric air, is very singular. What would be the effect of an atmosphere of pure azote? or oxigene?

By the simple decoction of the *Rhus radicans*, *vernix* and *glabrum*, a fawn colour of a darker or paler hue, is produced on flannel and silk; which appears to best advantage on the latter. By none of my experiments, I was able to impart to linen or muslin, the same colour that was easily imparted to flannel and silk: it appears necessary that they should previously undergo some process, to fit them for the reception of the colouring matter.

If the flannel or silk, was steeped in a solution of alum, before being boiled in the decoction of the different species, it acquired a very good yellow colour.

Every one of these colours was permanently fixed.*

It appears to me, from a review of my specimens, that several species of *Rhus*, and especially the *glab-*

* The result of these experiments agrees with those of Berthollet on the *Rhus coriaria*, "The *R. coriar.* alone, he says, gives a fawn colour inclining to green; but stuffs that have been impregnated with acetous alum, take a very good and durable yellow."

brum, might be employed with considerable advantage, in imparting a yellow colour to flannels.

Its cheapness, and the facility with which it is procured, ought certainly to recommend it to our dyers.

To the decoction of the seventh experiment, a small portion of acohol was added ; this appeared to increase the brilliancy of the colour : it is probable that the colouring matter of these plants is contained chiefly in their resinous part, which is rendered soluble by the extractive matter they possess in considerable proportion.*

CHEMICAL ANALYSIS of *the* RHUS VERNIX and RHUS RADICANS.

Experiment I. I distilled about two pounds of the flowers and leaves of the *Rhus vernix*, after adding to them a few quarts of water, in a small copper still ; a moderate degree of heat was applied ; the fluid which came over, was slightly impregnated with the odour of the plant, but did not appear to possess any active properties. From the liquor remaining after

* A young man, a native of the United States, is said to have prepared a kind of ink, resembling China ink, from the *Rhus radicans* ; for the exclusive privilege of making which, he procured (about 30 years ago) a patent from the British parliament. It appears probable to me, that it was prepared with the charcoal of the bark of the *Rhus radicans*, finely levigated and conglutinated by means of gum or glue.

distillation, I obtained by evaporation one ounce of extract, of a dark brown colour.

Experiment II. About two pounds of the leaves and flowers of the *Rhus radicans*, were distilled, like those of the vernix in the last experiment, and with a similar result. I obtained no essential oil, either by this or by the last experiment ; although the odour of the flowers of both species was highly aromatic, and appeared to indicate its presence. It is probable, that by employing very large quantities of the flowers, a small portion of essential oil might be obtained. I had not an opportunity of determining with accuracy, the properties of the distilled water ; I have no doubt, but that in persons who are easily affected by the poison of these plants, it would produce a cutaneous eruption. *Du Fresnoy** observes, “ the leaves inflamed and swelled the hands and arms of those that took them out of the still, and brought on an itching, which remained for several days.” No effect was produced on my hands by handling the leaves, remaining after distillation ; the cause of which was mentioned in a former part of this essay.

The liquor remaining after distillation, and a solution of the extracts, of both species, produced a copious black precipitation in a solution of sulphate of

* Des propriétés de la plante appelée *Rhus-radicans*, pag. 45.

iron.* Might not an extract of the *Rhus glabrum*, be advantageously employed for the purpose of dying black? It would contain the gallic acid in a very concentrated state, a small quantity only would be requisite, and it might be very conveniently preserved for use.

Experiment III. Several ounces of the berries of the *Rhus vernix*, *radicans* and *glabrum*, were separately exposed in a retort, to an intense degree of heat. A pellucid fluid, of an empyreumatic smell, first passed into the receiver; the degree of heat being increased, a black empyreumatic oil was obtained, resembling that which by this process is procured from most vegetables. The result was the same with the three different species. In the pellucid fluid which first came over, a slight precipitation was produced by potash, sulphuric acid and oxygenated muriate of mercury. This distillation, with a violent degree of heat, is at present generally omitted in the analysis of vegetables; from plants which possess the most opposite properties, from "cabbage and hemlock", the same products are obtained. I was convinced of its fallacy, by the result of these experiments: the presence of the gallic acid, one of the chief component parts of these vegetables, was scarcely discoverable in the products of this distillation.

* The quantity of extract which I obtained after the distillation of the *Rhus radicans*, amounted to six drams.

Experiment IV. From one ounce of the dried bark of the *Rhus radicans*, I obtained, by frequent infusions with rain water, thirty-five grains of pure extract.

Experiment V. One ounce of the powdered bark of the *Rhus radicans*, was repeatedly infused in highly rectified alcohol; by spontaneous evaporation, after carefully filtering this infusion, I obtained fifty-five grains of an elegant shining, deep-brown resin.

Experiment VI. Four drams of the powdered bark of the *Rhus vernix*, afforded two scruples of resin, resembling that obtained from the *R. radicans*. A solution of the resin of both species in alcohol, produced in a solution of the sulphate of iron, a copious black precipitation. This resin very much resembles the juice exuding from the bark of these plants. It is probable, that it might be collected in this manner, for the purposes of varnish.

Experiment VII. By infusing the bark of both species, in common spirit, a considerable quantity of a gum-resinous substance, of a brown glossy appearance, was obtained.

Experiment VIII. A quantity of the leaves of the *Rhus radicans* and *glabrum*, being infused in boiling water, and exposed to a warm temperature, (in the month of July) soon passed into a state of fermentation, and emitted a smell resembling that of small-beer. Whether upon distillation spirit of wine might be obtained from them, I have not yet determined.

Of the MEDICAL PROPERTIES of the RHUS RADICANS.

Little is at present known, concerning the *internal* effects of the *Rhus radicans* on the human body, or concerning its qualities as an article of the *materia medica*. To determine its probable utility or inefficacy in the cure of diseases, was one of the objects, which at the commencement of the examination of the properties of this vegetable, I had particularly in view. A defect of proper cases for its exhibition, and the interference of a variety of other pursuits, have prevented me from collecting the necessary materials for this purpose. A concise statement of what has been written on this subject by others, and a few facts and observations, which I have had an opportunity of collecting, will be related in this section : in how far future experiments will confirm or refute these observations, I am not able even to conjecture.

To a man, who had laboured under pulmonary consumption nearly two years, and who was in a very debilitated state, I gave two ounces of a strong infusion of the leaves of the *Rhus radicans* ; it excited some fever, increased the frequency and hardness of his pulse, produced pain in his bowels, and an increased flow of urine ; after the disappearance of these symptoms, his pulmonary complaint was considerably relieved. His wife, invited by the agreeable odour of the infusion, drank a tea-cup full ; it produced

an unusual degree of cheerfulness, and a copious discharge of urine.

A person who had been afflicted above a year, with a very obstinate headach, took four ounces of a strong infusion of the leaves of the *R. radicans*. In consequence of this, he discharged, by his own account, in one night nearly as much urine, as he was accustomed to do in a week. He had been in the habit of discharging very small quantities.

In the case of a woman, who had universal anasarca, the infusion produced a copious perspiration, by which she was considerably relieved.

In two cases of pulmonary consumption, in which the infusion of the leaves, and small quantities of the extract were exhibited, they appeared to produce an increase of the symptoms of the disease, and were soon omitted. The subject of the first of these cases was a man in the early stage of the disease; the other, a woman about twenty-five years of age, originally of a plethoric habit: the extract produced a pain in her stomach. In another case of the same disease, small quantities of the extract evidently relieved the symptoms; the person was aged; the medicine, in her opinion, relieved her by keeping the bowels open.

From the foregoing cases it appears, that the *Rhus radicans* acts slightly as an incitant and diuretic.

It is a very general opinion, among the inhabitants of the western parts of Pennsylvania, especially about

Carlisle, that the *Rhus radicans* is an effectual remedy in the cure of phthisis pulmonalis. Dr. Woodhouse in his inquiries concerning this subject, met with a young man, who lived in the vicinity of that place, and who had been relieved of a pulmonic affection, by an extract prepared from the bark of this vegetable. The young man informed him, that it relieved the pain in the breast, produced an eruption on the skin, and a slight salivation; and that it opened the bowels. He remarked likewise, that in order to derive benefit from it, it is necessary to take large quantities. Schœpf, in his *mat. med. Americana*, has the following observation: “*Radices (R. radicans) a nonnullis in Asthmate chronico bono cum successu adhibebantur in Lancaster.*”

If it should be found, by further trials, that the *Rhus radicans* internally exhibited, is not an active medicine; the effects which it produces on the external surface of the body, may still render it highly valuable, in the cure of many diseases. Its application for evident reasons, will be confined to particular habits and constitutions. A determination to the skin produces relief in many acute diseases; and the production of violent cutaneous affections, has cured or relieved many diseases of a chronic nature. Eruptive diseases have in several instances removed mania. Melancholia and epilepsy have been cured by inoculation for the itch.* Eruptions and burns have frequently

* Instances of this are related by Drs, Muntzell and Zimmermann.

suspended epilepsy and relieved fatuity.* A case of herpes, cured by the eruption excited by the *Rhus radicans*, is related by Fresnoy. (See the Appendix.)

In certain stages of mania, melancholia and pulmonary consumption ; in epilepsy, palsy and other chronic diseases, which for a long time had resisted the effects of powerful remedies ; in habits that are acted upon by the *Rhus radicans* or Vernix, I should not hesitate to excite an universal cutaneous eruption, by means of the poison of these plants. There appears to be considerable ground, for a reasonable supposition, that at least in some instances, this treatment would remove a disease or palliate its symptoms.

A dissertation has lately been published by Dr. I. Alderson of England, on the *Rhus toxicodendron*, which he particularly recommends in paralytic affections ; (as appears from Darwin's *Zoonomia*.)

From one to four grains of the powder of the dried leaves, are to be taken three or four times a day. I have not had an opportunity of seeing this dissertation.

One treatise only has hitherto been published on the medical properties of the *Rhus radicans*. It is entitled : *Des propriétés de la plante appelée Rhus Radicans. De son utilité et des succès, qu'on en a obtenu pour la guérison des Dartres, des affections Dartreuses, et de la Paralyse des parties, inférieures.*

* A case of epilepsy, cured by the small pox, is related by Dr. S. Cooper, in his *Inaugural Dissertation on Stramonium*.

Par M. Du Fresnoy, M. D. 1788. Dr. Du Fresnoy was led by accident to the employment of this vegetable in herpetic eruptions. The case which first suggested to him its use, is curious ; it is related in the appendix. Before he exhibited the *Rhus radicans* to other persons, Du Fresnoy ascertained its dose by experiments made upon himself. Perceiving no effect from taking an infusion of one of the leaves of the plant, he gradually increased the number of leaves for each infusion, to twelve. “ At this dose, he says, I observed a slight pain in my stomach, and my perspiration and urine were increased in quantity.”

He relates seven cases of obstinate herpetic eruptions, which had resisted several powerful remedies, but which were cured by the infusion of the distilled water of the *Rhus radicans*. After ascertaining the good effects of this vegetable, in the cure of herpes, he met with a case of palsy, which was ascribed to the suppression of an herpetic eruption ;* he exhibited the extract of the *Rhus radicans*, and by this remedy, continued about two months, succeeded in curing his patient.

The successful issue of this case, suggested the employment of the extract of the *Rhus radicans* in several other cases of palsy, four of which were cured.

L 2

* Soupçonnant donc que l'humeur Dartreuse pouvoit bien être la cause de sa *Paralyse*, je crus devoir saisir cette occasion d'essayer l'extract de *Rhus Radicans*,

by this remedy. These cases are related in his treatise, with great accuracy and minuteness.

Du Fresnoy, from the fortunate event of the cases just mentioned, is led to consider the *Rhus radicans* as a specific for those paralytic affections of the inferior extremities, which succeed convulsions: "Je ne crois pas devoir hésiter à présenter le *Rhus radicans*, comme un spécifique pour la *Paraplexie*, ou *Paralytie*, des extrémités inférieures, lorsqu'elle est la suite des mouvements convulsifs." He mentions in his treatise three species of this disease: palsies of the upper extremities; palsies in consequence of apoplexy, and palsies which follow convulsions. In the two former species he did not succeed with this remedy.*

It is somewhat difficult to conceive, according to our present ideas of this disease, that in palsies which affect different parts of the body, the same remedy should produce such different effects. It would have been desirable, if Du Fresnoy had related more definitely the symptoms and habits of those patients in whom the remedy failed. Does he consider para-

* "Il y a des Paralytiques qui ont eu le courage de prendre de l'extrait de *Rhus radicans*, jusqu'à la dose d'une once, trois fois le jour, sans en ressentir le plus léger effet.

The usual dose of the extract, will appear from a case related in the appendix. It is generally requisite, in order to derive benefit from it, to exhibit it in large doses. From two grains to several drams three or four times a day, have frequently been given by Dr. Fresnoy.

lytic affections of different parts of the body as essentially different, and depending on different causes? Many trials yet are necessary, before we can draw a certain conclusion concerning the use of this remedy in palsies. Much credit however, is due to Dr. Du Fresnoy for this dissertation; he appears to be candid in the relation of his cases, his remarks are made with caution, and indicate great accuracy of observation.

A P P E N D I X.

A. Description of the *Rhus Vernix* of Japan: extracted from Kämpfer's *Amœnitates Exoticæ*, pag. 791, 2 & 3.

Sitz, vel *Sitztsju*, i. e. *Sitz* planta, vulgo *Urûs* seu *Urus no ki*. Arbor vernicifera legitima, folio pinnato Juglandis, fructu racemoso ciceris facie.

Arbor paucis ramis brachiata, salicis ad altitudinem luxuriose exsurgit. Cortice donatur incano, ex verruculis scabro, facile abscedente; *ligno* saligneo fragillimo; *medulla* copiosa, ligno adnata; *Surculus* longis crassis in extremitate inordinate foliosis. *Folium* est impariter pennatum, spithamale vel longius, Juglandis folio æmulum, costa tereti, leviter lanuginosa; quam a semipalmari nuditate stipant lobi sive folia simplicia, pediculo perbrevis nixa, tenuia, plana, ovata, trium vel quatuor unciarum longitudinis, basi inæqualiter rotunda, mucrone brevi angusto, margine integro, suprema facie obscure viridi, lævi, et ex nervis lacunosa, dorso incano et molliter lanuginoso. Nervus medius in mucronem terminans subinde multos a latere demittit nervos minores, citra marginem deficientes. Sapor folio sylvestris inest, cum sensibili calore; humor affrictis extemplo chartam ferrugineo colore imbuunt. In surculis quibusdam ex foliorum axillis singuli surgunt *Racemi* laxè ramosi, palmares, tenues, qui, petiolis in calyculos rotundos desinentibus, *Flosculos* continent pumilos, et citra Coriandri seminis magnitudinem radiantes, in luteum herbaceos, pentapetalos, petalis carnosiss nonnihil oblongis et repandis; itaminibus ad petalorum interstitia singulis, apicatis, brevissimis,

stylo perbrevis tricuspide, floris turbini infidente. Ordorem spirant dulcem, Aurantio flori affinem et pergratum. *Fruſtus* floſculum excipit gibboſus, utcumque in rhomboidis figuram compreſſus, biſidus, facie ac magnitudine ciceris, membranula tenui micante veſtitus, per maturitatem duriffimus et obſoleti coloris.

Cortex arboris cultro crenatus lacteum fundit lentorem, humore cryſtallino (ex aliis duſtibus ſtillante) permixtum, qui ad aëris contactum nigreſcit. Eundem furculi diviſi, foliorum pediculi, et nervi produnt, nullius guſtabilis qualitatis participem, niſi caleſcientis ſine acredine. Venenatos tamen ſpiritus hæc arbor exhalare dicitur, vehementes adeo, ut pueris circa eandem commorantibus exanthemata in corpore pariant: qualia etiam lignum tractantes alii (non omnes) experiuntur. Collectio *Uruſj*, ſive Vernicis, ut inſtituatur, caudices præcipue triennes, paucis crenis vulkerandæ ſunt, ex quibus ſtillans liquor ſubinde excipitur, iterata in recente loco ſectione, donec exſucci marceſcant. Emulſi atque omni ſucco orbat, illico amputandi ſunt; ſic nova e radice provenit ſoboles, quæ triennis facta, collectioni denuo ſubjicitur.

B. The following interesting caſe was obligingly communicated to me by *Dr. Charles Caldwell*.

Philadelphia, April 16th. 1798.

Dear Sir,

“ In the ſummer of ninety-seven T— L—, a boy of about twelve years old, and poſſeſſing a very high degree of what is denominated a melancholic temperament, was expoſed to the action of the *Rhus radicans*. I am unable to ſay whether or not he handled the leaves of the plant, or was only ſubjected to the contact of the effluvia which it emits.

As circumſtances render it probable that our patient was expoſed, for ſeveral days in ſucceſſion, to the action of this poiſon, it is impoſſible to tell what length of time elapſed after he had actually received the infection, (for ſo I ſhall term it) previously to the commencement of the diſeaſe which it produced. The following is a brief ſketch of the firſt appearance and ſubſequent progreſs of the ſymptoms of his illneſs.

The diſeaſe was uſhered in by an attack on his hands and face, which were affected with an eruption accompanied by ſome degree of redneſs and ſwelling. A fever ſucceeded, attended by unuſual drowſineſs, ſome thirſt, and conſiderable conſtipation of the bowels. The fever continued for ſeveral days, during which time the eruption ſpread gradually over his whole body, in a manner, as well as I recolleſt, much reſembling the progreſs of the inoculated ſmall-pox. A ſwelling and very troubleſome itchineſs accompanied the eruption through the whole of its courſe.

The exact term during which our patients febrile symptoms continued I do not now recollect. In about ten or twelve days from the commencement of his attack the eruption had, in a great measure, disappeared from his hands and face, and continued to die away on the ^{other} parts of his body in the same gradual manner in which it first made its appearance. So severe and painful was the affection on his lower extremities, that for several days he was unable either to sit, walk or stand without experiencing much distress.

During the course of his illness he was bled twice, kept cool and quiet, and took two or three doses of purgative medicines. Of the exact appearance of his blood I am not able to inform you, having had no opportunity of seeing it after it was drawn. By those who examined it, it was said to be *very bad*, from which I think it probable that it was marked with an appearance of size. This, however, I advance only as a matter of supposition. — What, or whether any external applications were used, I do not now with certainty remember; for I was not the attending physician, but only an occasional visitant in the family.

From the foregoing statement it would appear, that the poison of the *Rhus radicans* acts in a manner somewhat similar to the contagion of the small-pox when communicated to the system through the medium of inoculation. In the case of T — L —, the hands and face having been exposed naked to the poisonous effluvia, may be considered as the immediate seat of inoculation. These accordingly became first disordered, by a topical eruption. In a short time a fever supervened, and the eruption extended to the other parts of the body, in a manner analogous to the inoculated small-pox.

If the foregoing communication can avail you any thing in your present interesting investigation, I beg you to consider it entirely at your command, and to give me credit for the sincerity with which I have the pleasure to be

Your friend and

Very humble servant,

CHARLES CALDWELL.

C. An account of the case which suggested to Dr. *Du Fresnoy* the exhibition of the *Rhus radicans* in herpetic affections.

A young man, he first informs us, had voluntarily rubbed his hands with the leaves of the *Rhus radicans*: the succeeding day, he perceived an eruption on his hands, which he mistook for the itch. He then proceeds: “ *Le lendemain les mains & les poignets, dont le gonflement avoit augmenté la nuit, étoient couverts d’une*

grande quantité de petites vésicules, qui se remplirent en grossissant de plus en plus pendant sept ou huit jours, d'une sérosité jaunâtre, qui annonçoit un éréfipèle fâcheux. Malgré les saignées, les bains, les fomentations émollientes & les boissons délayantes, la tête s'enfla si fort, qu'il fut aveugle, par le gonflement prodigieux des paupières, pendant plus de vingt-quatre heures. Les démangeaisons se portèrent ensuite sur toutes les parties du corps, principalement les chevelues & celles de la *génération* qu'il se mit en pièces à force de se gratter. Au bout de dix jours, les accidens cessèrent, les poignets, qui avoient jeté une grande quantité de sérosités, se dépouillèrent de leur épiderme. Il fut fort étonné de se voir guéri d'une *Dartre* qu'il portoit au poignet depuis plus de six ans, & qui avoit éludé les frictions, le sublimé corrosif à la plus haute dose, & les remèdes prescrits par les personnes de l'Art les plus éclairées de la Province. Depuis, cette Dartre n'a plus reparu.

Mr. Du Fresnoy's dissertation on the Rhus radicans.

D. Account of a case of palsy which supervened in consequence of an herpetic eruption, and which was cured by the extract of the Rhus radicans. From *Fresnoy's* dissertation,

" L'objet de la premiere observation étoit un jeune homme, âgé de 14 à 15 ans, Perruquier de son métier. Le 7 Janvier je fis prendre au malade, deux grains d'extract en bol, quatre fois le jour, à sept heures & à dix du matin, à quatre & à neuf heures du soir.

Le 8, six grains quatre fois le jour.

Le 9, dix grains.

Le 10, seize grains.

Le 20, vers le soir, le malade a commencé à remuer très-légèrement les doigts du pied. J'ai successivement augmenté les prises d'extract, de six grains par jour, jusqu'à ce que je fusse parvenu à la dose d'un gros par prise; dose à laquelle je me suis tenu pour ce malade, jusqu'à parfaite guérison.

Le 14, il a levé la jambe.

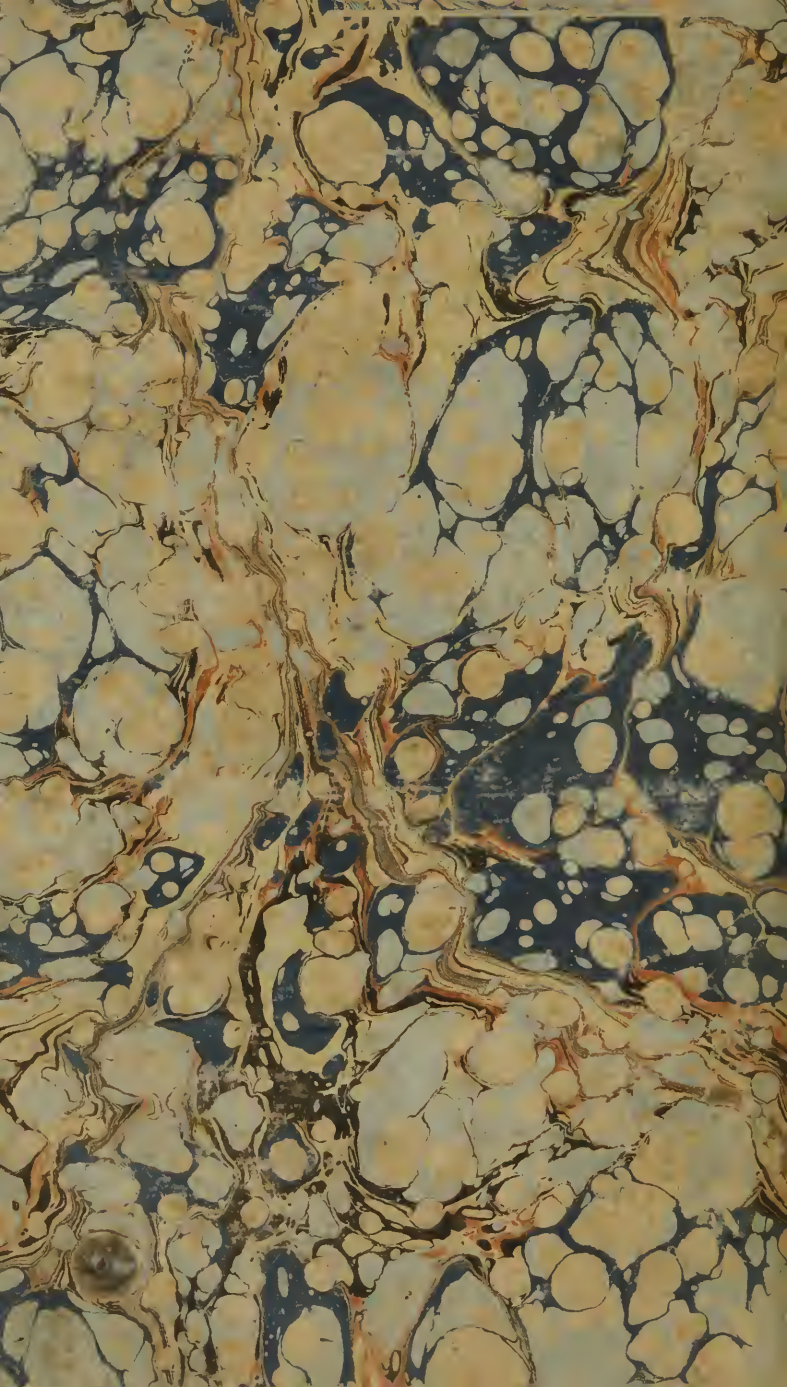
Le 16, il a remué les doigts de la main, & s'est tenu sur les jambes, étant soutenu par les bras.

Le 24, il a marché, soutenu par la main.

Le 27, il ôtoit son bonnet, de la main malade.

Le 2 Février, il marchoit à l'aide d'une canne.

Il a toujours continué d'aller de mieux en mieux. Quand il est sorti de l'Hôtel-Dieu (le 14 Mars), il mettoit des papillotes, accommodit les cheveux & rasoit, à peu-près aussi aisément qu'avant son accident. Il paroissoit ne lui rester d'une maladie aussi grave, qu'une légère difficulté dans les mouvemens du bras malade, qu'il n'avoit point avant son Hémip'égie,



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